

# **Nationally Harmonized Modular Curriculum for Bachelor Degree in Pharmacy (B.Pharm)**

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**Addis Ababa**

## **Program : Bachelor Degree in Pharmacy (B.Pharm)**

### **BACKGROUND INFORMATION**

Ethiopia is a country characterized by low socio economic status and health service coverage. As a result, there is low ratio and improper mix of health professional to the population. The current Ethiopian health policy is based on health promotion and disease prevention by giving priority to the rural and unprivileged urban population. Successful implementation of this policy is highly dependent on availability of well-trained health professionals, both in quality and quantity. Education is a mainstay for development and alleviation of rampant problems of a given nation. It can offer opportunities to the citizens of a country to play a pivotal role in bringing and sustaining the required development in various sectors in which the health delivery system is not an exception. The pharmacy service as an essential component of the health care delivery system requires properly trained professionals.

The needs of modern health care systems require that the role of the pharmacist develop rapidly to meet its demands. Pharmacists' vital role remains primarily to ensure accurate dispensing of prescribed medicines against prescriptions and providing sound advice on responsible self-medication. Equally important roles that have been recognized are for pharmacists to advise other healthcare professionals on safe and rational use of medicines and to accept responsibility for seeking to ensure that medicines are used safely and effectively by those to whom they are supplied so that maximum therapeutic benefit is derived from treatment. This activity contributes both to the welfare of the individual and the overall improvement of public health.

Consequently, the activities of the pharmacist would involve not only contributing to discussions leading to appropriate prescribing but also advising people on how to use medicines effectively. These developments however impose important ethical demands on the profession which must be underpinned both by legislation and by changes in the pre-service and continuing education of pharmacists. The pre-service education is designed to ensure that the newly qualified pharmacist has the necessary knowledge and skills to commence practicing competently in a variety of settings including community and hospital pharmacy and the pharmaceutical industry. The

implementation of Pharmaceutical Care, while recognizing the responsibility of the patient as end user of a medicine, requires the pharmacist along with other health care team members to use a range of processes to facilitate the responsible provision of medicinal treatment until tangible results are achieved, improving the patient's quality of life.

Pharmacists provide their services in a variety of settings in response to a dynamic and evolving set of primarily local health care priorities and needs. There are also regional, national and international policies and factors, which dictate the need for developments in pharmacy practice. Within this context, pharmacists are medication experts in the treatment of disease and in health promotion.

This expertise, in its broadest sense, encompasses the preparation, supply and control of medicinal products and assurance of desired outcomes of treatment by medication. It thus begins with the medicine development process and continues through to medication's ultimate benefit to the individual and to society generally. This expertise has its foundations in the pharmaceutical sciences and related research, and has its focus on the individual and populations.

## **Rationale for Modularization**

The main rationale for modularization is the need to enhance students' competency through competency based curriculum. All the public universities in the country are supposed to implement modular approach of teaching and learning in 2005 E.C. Each University is now prepared to fully implement modular approach in the 2005 E. C. The following are the main rationales for Pharmacy program to prepare and going to implement modular approach in the coming academic year.

Studies have shown that teaching and learning practices have been influenced for a long time by behavior and it seems appropriate that motivation and commitment from a learner can be ensured by rewarding, encouraging and supporting behavior. Modules enable performance to be measured immediately and rewarded.

It is clear that modules offer the learner the chance to realize their full potential by solving problems by themselves. Modules afford the learners the chance to realize their full potential by being responsible for their own learning and being in charge of the learning process.

The other rationale is the continued institutional transformation of each University recommends to implement competency based modular curriculum.

## **OBJECTIVES OF THE PROGRAM**

Educational Objectives and competency profile

### **General Objectives:**

The general objective of the B.Pharm Program is to train highly qualified pharmacists who fulfill the essential, minimum common expectations of health care systems worldwide while fulfilling local needs.

Graduates would be expected to have the required knowledge, skill, attitude and behavior to support the health care system and to respond to patient needs work in hospital and community pharmacies; drug manufacturing, import and wholesale companies; public health services; academic institutions; pharmaceutical research; drug regulatory body and quality control organizations

### **Specific Objectives:**

- To train manpower that is more patient-oriented while still having a broad pharmaceutical knowledge that can easily adapt to working in any of the pharmaceutical services of the country.
- To provide practice-based training so that future pharmacists acquire problem-solving skills.
- To facilitate and assist in the transfer and adaptation of pharmaceutical knowledge

### **Demand for the program**

At present, in Ethiopia, health institutions (hospitals, health centers, NGOs, and others), higher institutions (government and private), research institutions and pharmaceutical industries that

require competent pharmacy professionals at different level of training and expertise are progressively growing. As a result, ample opportunities are created for pharmacy practitioners to play a vital role in the country's development. However, the input of these professionals to a great extent depends on the quality of education (training) they receive in the higher learning institutions or universities

The curriculum review has taken into consideration the existing socio-economic demands, government policies and global experience in training pharmacists. During the revision of the curriculum feedback from stakeholders, former graduates of different universities, and internal and external assessors was given serious consideration. The global experience in pharmacy curriculum design and implementation was also considered.

## **Professional Profile**

To be effective health care team members, pharmacists need skills and attitudes enabling them to assume many different functions. The concept of the “seven-star pharmacist” was introduced by WHO and taken up by FIP in 2000 in its policy statement on Good Pharmacy Education Practice to cover these roles: caregiver, decision-maker, communicator, manager, life-long learner, teacher and leader. The function of the pharmacist as a researcher was later on added.

These roles of the pharmacist are described below and include the following functions:

- Caregiver: Pharmacists provide caring services. They must view their practice as integrated and continuous with those of the health care system and other health professionals. Services must be of the highest quality.
- Decision-maker: The appropriate, efficacious, safe and cost-effective use of resources (e.g., personnel, medicines, chemicals, equipment, procedures, and practices) should be the foundation of the pharmacist's work. At the local and national levels, pharmacists play a role in setting medicines policy. Achieving this goal requires the ability to evaluate, synthesize data and information and decide upon the most appropriate course of action.

- **Communicator:** The pharmacist is in an ideal position to provide a link between prescriber and patient, and to communicate information on health and medicines to the public. He or she must be knowledgeable and confident while interacting with other health professionals and the public. Communication involves verbal, non-verbal, listening and writing skills.
- **Manager:** Pharmacists must be able to manage resources (human, physical and financial) and information effectively; they must also be comfortable being managed by others, whether by an employer or the manager/leader of a health care team. More and more, information and its related technology will provide challenges as pharmacists assume greater responsibility for sharing information about medicines and related products and ensuring their quality.
- **Life-long-learner:** It is impossible to acquire in pharmacy school all the knowledge and experience needed to pursue a life-long career as a pharmacist. The concepts, principles and commitment to life-long learning must begin while attending pharmacy school and must be supported throughout the pharmacist's career. Pharmacists should learn how to keep their knowledge and skills up to date.
- **Teacher:** The pharmacist has a responsibility to assist with the education and training of future generations of pharmacists and the public. Participating as a teacher not only imparts knowledge to others, it offers an opportunity for the practitioner to gain new knowledge and to fine-tune existing skills.
- **Leader:** In multidisciplinary (e.g., team) caring situations or in areas where other health care providers are in short supply or non-existent the pharmacist is obligated to assume a leadership position in the overall welfare of the patient and the community. Leadership involves compassion and empathy as well as vision and the ability to make decisions, communicate, and manage effectively. A pharmacist whose leadership role is to be recognized must have vision and the ability to lead.
- **Researcher:** The pharmacist must be able to use the evidence base (e.g., scientific, pharmacy practice, health system) effectively in order to advice on the rational use of medicines in the health care team. By sharing and documenting experiences, the pharmacist can also contribute to the evidence base with the goal of optimizing patient

care and outcomes. As a researcher, the pharmacist is able to increase the accessibility of unbiased health and medicines-related information to the public and other health care professionals

## **Graduate Profile**

A student who has successfully completed the Bachelor Pharmacy degree will be able to apply his/her knowledge, skills, and attitudes as follows:

It is envisaged that pharmacy graduates with the B.Pharm. Degree will be capable to assume the following responsibilities and attributes:

### **Core graduate competencies**

- Organize and control the manufacturing, compounding and packaging of pharmaceutical products;
- Organize the selection, procurement, storage, and distribution of pharmaceutical materials and products;
- Provide Pharmaceutical Care and Dispense and ensure the optimal use of medicines by the patient;
- Provide pharmacist-initiated care to patients and ensure the optimal use of medicines;
- Provide education and information on health care and medicines;
- Promote community health and provide related information and advice; and
- Conduct in research to ensure the optimal use of medicines.
- Demonstrate a high level of professional ethics in order to satisfy the pharmaceutical needs of the society.
- Maintain and expand knowledge through self-directed learning.
- Be able to work as a member of the health team.
- Possess the necessary background to pursue further advanced study in the pharmaceutical sciences.



The core competencies have the following knowledge, attitude and skill attitude components

#### Knowledge

- Use his/her critical thinking to improve the pharmacy working environment
- Familiarize him/her with latest scientific findings to improve the quality of services rendered to the society.
- Demonstrate a high level of professional ethics in order to satisfy the pharmaceutical needs of the society.
- Maintain and expand knowledge through self-directed learning.
- Possess the necessary background to pursue further advanced study in the pharmaceutical sciences.
- Provide pharmacist-initiated care to patients and ensure the optimal use of medicines;
- Provide education and information on health care and medicines;
- Promote community health and provide related information and advice; and
- Participate in research to ensure the optimal use of medicines.

#### Attitude

- Maintain the pharmacy ethical code of conduct standards
- Advocate the proper use of necessary materials by screening.
- Contribute to stewardship of their profession.
- Recognize, adhere & promote established safety rules
- Pursue graduate training in pharmacy and other health related disciplines
- Institute & promote safety, quality control & quality assurance in their allowed work area
- Participate in policy, professional standards, continuing professional development issues pertaining to pharmacy profession
- Respectful and compassionate to patients, their relatives and other professionals
- Be able to work as a member of the health team.

#### Skill

- Organize and control the manufacturing, compounding and packaging of pharmaceutical products;

- Organize the selection, procurement, storage, and distribution of pharmaceutical materials and products;
- Provide Pharmaceutical Care and Dispense and ensure the optimal use of medicines by the patient;
- Participate and/or conduct research & development of new drugs discovery technologies
- Plan drugs and equipments logistic procurement, evaluation, setup & auditing and Monitor the inventory in storage, work and laboratory area
- Provide professional services, leadership & quality assurance in work areas.
- Monitor and maintain proper functioning of necessary equipments/reagents
- Store and use laboratory supplies and dispose expired drugs safely according to the rules and regulations
- Screen for the presence of drugs of abuse
- Supervise pharmacy technicians
- Develop and modify laboratory procedures
- Demonstrate leadership and management skills
- Engage in policy, professional standards, & continuing professional development issues pertaining to pharmacy profession.
- Communicate effectively both verbally and in writing
- Collect, document, retrieve and interpret data related to all their activities clearly and safely

## **Admission Requirements**

### **Regular Program**

Admission requirements will be as per the University Senate Legislation

The University shall admit for undergraduate studies:

- Students who have completed Ethiopian high school education and satisfy its entrance qualification assessments.

- Applicants with foreign high school education of equivalent level to the Ethiopian high school education, as determined by the Ministry of Education , and who satisfy entrance requirements

## **Special Admission**

- Special admissions into some programs may be granted to attract potentially resourceful candidates such as mature students.
- A student who has successfully finished a set of particular modules which entitles him/her to a degree may also peruse other related modules and earn another degree continuously. Details guidelines shall be worked out by the concerned body.
- Private applicants who fulfill admission requirements for regular students and produce evidence of financial support to cover tuition fees and other expenses may apply for admission into the regular program. The Registrar's office shall set guidelines for such admissions which would be reviewed periodically and approved by the Senate.
- The student who has completed a minimum of one academic year of study in good academic standing in an Ethiopian institution of higher education or in a foreign institution recognized by the Ministry of Education or has a diploma in the same or related field if applying for admission into a degree program from an institution of higher learning may also be admitted by the university.

## **Duration of the study**

The bachelor degree in pharmacy requires 5 years or 10 semesters to cover 22 modules with a total of 300 EtCTS. A maximum of 10 EtCTS variation among universities is allowed as per the agreement.

## **Mode of delivery**

To cover all the modules the program uses a mixed mode of delivery (block and Parallel).

## Method of teaching

The following methods will be used as strategies to teach the courses within the different modules in the program:

- Lectures
- Laboratory practices
- Demonstrations
- Group works
- Home study
- Seminars
- Tutorials
- Home take assignments
- Hospital attachment
- Health center attachment
- Pharmaceutical industries attachments
- Community based learning
- Field supervision
- Team training program
- Research project
- Role play
- Symposium
- Talk show
- Drama etc.

## Assessment and evaluation mechanisms

Evaluation will be in the form of formative and summative assessment

- Formative assessment consists of,
  - ✓ Continuous assessment ( test, quiz, case presentation, assignment /individual –group exercise)

- ✓ Bed side ,round
  - ✓ Supervision
  - ✓ Log book
  - ✓ Assessment of practical skills
  - Summative assessment consists of:
    - ✓ Final written exam
    - ✓ Objective Structured Clinical Examination (OSCE)
    - ✓ Oral exam
    - ✓ Internal comprehensive exam and External exam
- N.B: Grading for internal comprehensive exam and external exam will be P/F, and the student should score greater or equal to 60% to pass.

## Grading System

The program uses criteria referenced method of evaluation to value the performance of students at the end of each semester. The instructor uses the scale fixed and grade based on the pre-settled criteria which are driven from the learning objectives of the topic/course. Thus, we do not use norm referenced method.

Accordingly students will be graded on the letter grade as well as on percentage grading system. The grading subsystem has to be adjusted to calculate the GPA based on the fixed scale range shown in the following table.

| Raw Mark Interval-<br>[100 %] | Interval of<br>Number Grade | Corresponding<br>Fixed Number<br>Grade | Corresponding<br>Letter Grade | Status Description | Class Description                     | ECTS Conversion to<br>the Conventional<br>Grading System | Conventional<br>Grade Points |
|-------------------------------|-----------------------------|--|-------------------------------|--------------------|---------------------------------------|--|------------------------------|
| [95,100]                      | =4                          | 4.0                                    | A <sup>+</sup>                | Excellent          | First class with<br>Great distinction | A <sup>+</sup>   | 4.0                          |
| [90, 95)                      | $3.5 \leq X < 4.0$          | 3.7                                    | A                             |                    |                                       | A  | 4.0                          |
| [85, 90)                      | $3.0 \leq X < 3.5$          | 3.3                                    | A <sup>-</sup>                |                    |                                       | A <sup>-</sup>   | 3.75                         |
| [80, 85)                      | $2.7 \leq X < 3.0$          | 3.0                                    | B <sup>+</sup>                | Very Good          | First class<br>with<br>Distinction    | B <sup>+</sup>   | 3.5                          |
| [75, 80)                      | $2.5 \leq X < 2.7$          | 2.7                                    | B                             |                    |                                       |  |                              |
| [70, 75)                      | $2.3 \leq X < 2.5$          | 2.5                                    | B <sup>-</sup>                | Good               | First<br>class                        | B  | 3.0                          |
| [65, 70)                      | $2.0 \leq X < 2.3$          | 2.3                                    | C <sup>+</sup>                |                    |                                       | B <sup>-</sup>   | 2.75                         |
| [58, 65)                      | $1.7 \leq X < 2.0$          | 2.0                                    | C                             | Satisfactory       | Second<br>Class                       | C <sup>+</sup>   | 2.5                          |
| [50, 58)                      | $1.3 \leq X < 1.7$          | 1.7                                    | C <sup>-</sup>                |                    | Pass                                  | C  | 2.0                          |
| [40, 50)                      | $1.0 < X < 1.3$             | 1.3                                    | D                             | Unsatisfactory     | Unsatisfactory                        | D  | 1.0                          |
| [30, 40)                      | = 1.0                       | 1.0                                    | Fx                            | Fail               | Fail                                  |  |                              |
| [0, 30)                       | 0                           | 0                                      | F                             |                    |                                       | F  | 0                            |

## Graduation Requirements

Graduation requirement will be according to each university rule and regulation. Thus, a student enrolled in the B.Pharm degree in pharmacy program is eligible for graduation if and only if he/she:

- Has taken all the required modules for the program
- Obtained a minimum cGPA of 2.00
- Student should be able to pass written and oral comprehensive exam of the program, both in theory & practice before graduation
- The student should pass the compressive exam to sit for external examination administered by external examiners.
- Has not scored ' F ' grade in any course, and should score minimum of ' C ' grade in any course of core modules.
- Pass successfully and complete clerkship/professional practice program.
- Has carried out a student research project on a selected and agreed topic of research problem and scored a minimum of ' C ' grade in his/her thesis report.

## Degree nomenclature

- Up on successful completion of this program the graduate will be awarded “The Degree of Bachelor of Pharmacy (B.Pharm)” in English and “የባችለር ዲግሪ በፋርማሲ” “in Amharic.

## Quality assurance mechanisms

The department quality assurance committee is responsible for the management & monitoring of the program. To assess the realization of the curriculum’s objectives both formative & summative evaluation guidelines will be used. The following mechanisms will be employed to evaluate whether the courses offered in the program meet the standards or not.

1. A course syllable according to the course content indicated in this catalog should be prepared for each course with time frame.
2. The respective School/departments will evaluate the agreement between examination contents & the course syllabi.
3. Recruitment of qualified staff
4. Examination and continuous assessment (formative and summative)

5. Periodic acquisition of up – to – date references, laboratory equipment & reagents
6. Supervised practices in the training health facilities
7. Periodic evaluation of the curriculum & the program in general
8. Final examination at end of every module
9. Periodic evaluation & revision of the curriculum based on the feedback from the stakeholders/employers, graduates & students.

## Module and course code assignment

In the module coding

- The alphabets should indicate to which program/department the module belong
- The numbers should be also four digits and
- The first number should indicate year of study (starting from 1- for 1st year, 2- for 2nd year, etc)
- The 2<sup>nd</sup> and 3<sup>rd</sup> number should indicate module number (a two digit code starting from 01, 02...etc)
- The last number indicates module category (core=1, elective=2, basic=3, general=4)
- In the course coding
  - The alphabets should indicate the course hosting department/program
  - The numbers should be also four digits
  - The first number should indicate year of study (starting from 1- for 1st year, 2- for 2nd year, etc)
  - The 2<sup>nd</sup> and 3<sup>rd</sup> number should indicate module number (a two digit code starting from 01, 02...etc)
  - The last number indicates the course number (starting from 1, 2...etc) within the module-



| List of modules |                 |  |             |   |             |      |            |
|-----------------|-----------------|--|-------------|---|-------------|------|------------|
| Module No       | Module category | Module Name                            | Module Code | Course Name   | Course code | ECTS | Total ECTS |
| 01              | General         | English Language Skills                | Enla-M1014  | Communicative English Skill                         | EnLa1011    | 5    | 10         |
|                 |                 |  |             | Basic Writing skill                                 | EnLa1012    | 5    |            |
| 02              | General         | Social sciences and humanities         | Sshm-M1024  | General Psychology                                  | Psyc1021    | 5    | 10         |
|                 |                 |  |             | Civics & Ethical Education                          | Cvet 1022   | 5    |            |
| 03              | Basic           | Biomedical sciences-I module           | Biom-M1033  | Human anatomy and histology                         | Anat1031    | 7    | 17         |
|                 |                 |  |             | Human Physiology-I                                  | Phyl1032    | 5    |            |
|                 |                 |  |             | Human Physiology-II                                 | Phyl1033    | 5    |            |
| 04              | Basic           | Chemistry                              | Chem-M1043  | Fundamentals of Organic chemistry                   | Chem1041    | 5    | 7          |
|                 |                 |  |             | Practical Organic chemistry                         | Chem1042    | 2    |            |
| 05              | Basic           | Biomedical sciences-II module          | Biom-M1053  | Biochemistry-I                                      | Bioc1051    | 5    | 22         |
|                 |                 |  |             | Biochemistry-II                                     | Bioc1052    | 5    |            |
|                 |                 |  |             | Microbiology, Immunology and Parasitology           | Mbio1053    | 7    |            |
|                 |                 |  |             | General Pathology                                   | Path 2054   | 5    |            |
| 06              | Basic           | Biostatistics and Epidemiology         | Com-H2060   | Biostatistics                                       | Com-H2061   | 3    | 11         |
|                 |                 |  |             | Epidemiology  | Com-H2062   | 3    |            |
|                 |                 |  |             | HIV/AIDS, SRH and Life skills                       | BShI 1011   | 5    |            |
| 07              | Core            | Introductory Pharmacy Module           | Phar-M2071  | Introduction to pharmacy                            | Phar2071    | 2    | 4          |
|                 |                 |  |             | Pharmaceutical calculations                         | Phar2072    | 2    |            |
| 08              | Core            | Pharmacognosy and Alternative Medicine | Phar-M2081  | Chemistry of Natural products                       | Phar2081    | 5    | 15         |
|                 |                 |  |             | Pharmacognosy                                       | Phar2082    | 7    |            |
|                 |                 |  |             | Complementary and alternative medicine              | Phar2083    | 3    |            |
| 09              | Core            | Dosage form Sciences                   | Phar-M2091  | Integrated physical pharmacy and pharmaceuticals-I  | Phar2091    | 9    | 18         |
|                 |                 |  |             | Integrated physical pharmacy and pharmaceuticals-II | Phar2092    | 9    |            |

|    |      |  |            |  |           |   |    |
|----|------|--|------------|--|-----------|---|----|
| 10 | Core | Pharmacology Module                            | Phar-M2101 | Pharmacology-I                                 | Phar2101  | 7 | 17 |
|    |      |  |            | Pharmacology-II                                | Phar3102  | 7 |    |
|    |      |  |            | Applied toxicology                             | Phar3103  | 3 |    |
| 11 | Core | Medicinal Chemistry                            | Phar-M2111 | Medicinal chemistry-I                          | Phar2111  | 7 | 12 |
|    |      |  |            | Medicinal chemistry-II                         | Phar3112  | 5 |    |
| 12 | Core | Pharmaceutical Analysis                        | Phar-M3121 | Pharmaceutical analysis-I                      | Phar3121  | 7 | 14 |
|    |      |  |            | Pharmaceutical analysis-II                     | Phar3122  | 7 |    |
| 13 | Core | Pharmaceutical Technology                      | Phar-M3131 | Industrial pharmacy                            | Phar3131  | 7 | 10 |
|    |      |  |            | Immunological and biological products          | Phar3132  | 3 |    |
| 14 | Core | Social and administrative pharmacy module      | Phar-M3141 | Health service management and policies         | Com-H3141 | 5 | 17 |
|    |      |  |            | Introduction to Pharmacoeconomics              | Phar3142  | 5 |    |
|    |      |  |            | Medical supplies, equipments and reagents      | Phar3143  | 2 |    |
|    |      |  |            | Drug supply management                         | Phar3144  | 5 |    |
| 15 | Core | Biopharmaceutics and Clinical Pharmacokinetics | Phar-M3151 | Biopharmaceutics and Clinical Pharmacokinetics | Phar3151  | 7 | 7  |
| 16 | Core | Pharmacotherapeutics Module                    | Phar-M4161 | Integrated therapeutics-I                      | Phar4161  | 7 | 30 |
|    |      |  |            | Integrated therapeutics-II                     | Phar4162  | 7 |    |
|    |      |  |            | Integrated therapeutics-III                    | Phar4163  | 7 |    |
|    |      |  |            | Integrated therapeutics-IV                     | Phar4164  | 7 |    |
|    |      |  |            | Physical Assessment                            | Phyd4165  | 2 |    |
| 17 | Core | Pharmacy practice module                       | Phar-M4171 | Drug informatics                               | Phar4171  | 3 | 25 |
|    |      |  |            | Communication skills for pharmacists           | Phar4172  | 3 |    |
|    |      |  |            | Pharmacy law and ethics                        | Phar4173  | 3 |    |
|    |      |  |            | Pharmacy practice-I                            | Phar4174  | 5 |    |
|    |      |  |            | Pharmacy practice-II                           | Phar4175  | 5 |    |
|    |      |  |            | First aid                                      | Nurs4176  | 3 |    |
|    |      |  |            | Nutrition                                      | Com-H4177 | 3 |    |

|            |          |                              |            |  |           |   |         |
|------------|----------|------------------------------|------------|--|-----------|---|---------|
| 18         | Elective | Professional Elective Module | Phar-M5182 | Introduction to pharmacoepidemiology                 | Phar4181  | 5 | 5       |
|            |          |                              |            | Phytochemistry                                       | Phar4182  |   |         |
|            |          |                              |            | Pharmaceutical Manufacturing                         | Phar4183  |   |         |
|            |          |                              |            | Pharmacogenetics                                     | Phar4184  |   |         |
|            |          |                              |            | Pharmaceutical quality control & Quality assurance   | Phar4185  |   |         |
|            |          |                              |            | Drug Design & Synthesis                              | Phar4186  |   |         |
| 19         | Core     | Pharmacy clerkship           | Phar-M5191 | Ambulatory Care Clerkship                            | Phar5191  | 7 | 43      |
|            |          |                              |            | Drug Information Service Clerkship                   | Phar5192  | 3 |         |
|            |          |                              |            | Internal Medicine Clerkship                          | Phar5193  | 7 |         |
|            |          |                              |            | Hospital Pharmacy Clerkship                          | Phar5194  | 5 |         |
|            |          |                              |            | Pediatrics Clerkship                                 | Phar5195  | 7 |         |
|            |          |                              |            | Gynecology/ Obstetrics and Family Planning Clerkship | Phar5196  | 3 |         |
|            |          |                              |            | Psychiatry Clerkship                                 | Phar5197  | 3 |         |
|            |          |                              |            | Surgery Clerkship                                    | Phar5198  | 3 |         |
|            |          |                              |            | Community Pharmacy Clerkship                         | Phar5199  | 5 |         |
| 20         | Core     | Elective attachment module   | Phar-M5201 | Pharmaceutical industry                              | Phar5201  | 3 | 3       |
|            |          |                              |            | Pharmaceutical quality control                       | Phar5202  |   |         |
|            |          |                              |            | Pharmaceutical regulatory attachment                 | Phar5203  |   |         |
|            |          |                              |            | Ophthalmology and ENT Clerkship                      | Phar5204  |   |         |
|            |          |                              |            | Oncology and Hematology Pharmacy                     | Phar5205  |   |         |
|            |          |                              |            | Dermatology Clerkship                                | Phar5206  |   |         |
|            |          |                              |            | Emergency Medicine                                   | Phar5207  |   |         |
|            |          |                              |            | Nuclear Pharmacy                                     | Phar5208  |   |         |
|            |          |                              |            | Pharmaceutical Whole sale & Promotion                | Phar5209  |   |         |
| 21         | Core     | Pharmaceutical Research      | Phar-M5211 | Research Methods                                     | Com-H5211 | 3 | 8       |
|            |          |                              |            | Student Research Project                             | Phar5212  | 5 |         |
| 22         | Core     | Team Training Program        | Com-HM5221 | Team Training Program                                | ComH5221  | 7 | 7       |
| Total ECTS |          |                              |            |  |           |   | 312 + * |

\*= A maximum of 20 ECTS discrepancy was noticed and accepted among universities. The discrepancy was unavoidable due to the firm universities philosophies.

## Module sequencing by semester and Year\*\*\*

### Year I Semester I

| Module Code | Module Name                           | Course Code | Course Title                       | Course ECTS | Course Cr.Hr | Mode of delivery | Duration (hrs) | Per week (hrs) |          |     |
|-------------|---------------------------------------|-------------|------------------------------------|-------------|--------------|------------------|----------------|----------------|----------|-----|
|             |                                       |             |                                    |             |              |                  |                | Lecture        | Tutorial | Lab |
| Enla-M1014  | English Language Skills               | Enla1011    | Communicative English Skill        | 5           | 3            | Parallel         | 135            | 3              | 0        | 0   |
| Sshm-M1024  | Social sciences and humanities        | Psyc1021    | General Psychology                 | 5           | 3            | Parallel         | 135            | 3              | 0        | 0   |
|             |                                       | Cvet 1022   | Civics & Ethical Educ <sup>n</sup> | 5           | 3            | Parallel         | 135            | 3              | 0        | 0   |
| Biom-M1033  | Biomedical sciences-I module          | Anat1031    | Anatomy and Histology              | 7           | 4            | Parallel         | 189            | 4              | 1        | 0   |
|             |                                       | Phyl1032    | Human Physiology-I                 | 5           | 3            | Parallel         | 135            | 3              | 1        | 0   |
| Com-HM2063  | Biostatistics and Epidemiology module | BShI 1011   | HIV/AIDS, SRH and Life skills      | 5           | 3            | Parallel         | 135            | 3              | 0        | 0   |
|             |                                       |             |                                    | 32          | 19           |                  |                |                |          |     |

### Year I Semester II

| Module Code | Module Name                   | Course Code | Course Title                              | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Per week (hrs) |          |        |
|-------------|-------------------------------|-------------|---|-------------|---------------|------------------|----------|----------------|----------|--------|
|             |                               |             |   |             |               |                  |          | Lecture        | Tutorial | Lab    |
| Enla-M1014  | English Language Skills       | EnLa1012    | Basic Writing skill                       | 5           | 3             | Parallel         | 135      | 3              | 0        | 0      |
| Biom-M1033  | Biomedical sciences-I module  | Phyl1033    | Human Physiology-II                       | 5           | 3             | Parallel         | 135      | 3              | 1        | 0      |
| Chem-M1043  | Chemistry module              | Chem1041    | Fundamental Organic chemistry             | 5           | 3             | Block            | 135      | 10 (5wk)       | 0        | 0      |
|             |                               | Chem1042    | Practical Organic chemistry               | 2           | 1             | Block            | 54       | 0              | 0        | 1(1wk) |
| Biom-M1053  | Biomedical sciences-II module | Bioc1051    | Biochemistry-I                            | 5           | 3             | Block            | 135      | 10 (5wk)       | 0        | 0      |
|             |                               | Bioc1052    | Biochemistry-II                           | 5           | 3             | Block            | 135      | 10 (5wk)       | 0        | 0      |
|             |                               | Mbio1053    | Microbiology, Parasitology and Immunology | 7           | 4             | Parallel         | 189      | 3              | 1        | 1      |
|             | <b>Semester Total</b>         |             |   | 34          | 20            |                  |          |                |          |        |

## Year II Semester I

| Module Code | Module Name                                   | Course Code | Course Title                                     | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Perweek (hrs) |          |     |
|-------------|---|-------------|--|-------------|---------------|------------------|----------|---------------|----------|-----|
|             |   |             |  |             |               |                  |          | Lecture       | Tutorial | Lab |
| Phar-M2071  | Introductory Pharmacy Module                  | Phar2071    | Introduction to pharmacy                         | 2           | 1             | Parallel         | 54       | 1             | 0        | 0   |
|             |   | Phar2072    | Pharmaceutical calculations                      | 2           | 1             | Parallel         | 54       | 1             | 1        | 0   |
| Phar-M2081  | Pharmacognosy and Alternative Medicine module | Phar2081    | Chemistry of Natural products                    | 5           | 3             | Parallel         | 135      | 3             | 0        | 0   |
| Biom-1053   | Biomedical Science II module                  | Path 2054   | General Pathology                                | 5           | 3             | Parallel         | 135      | 3             | 0        | 0   |
| Com-HM2063  | Biostatistics and Epidemiology module         | ComH-2061   | Biostatistics                                    | 3           | 2             | Parallel         | 81       | 2             | 0        | 0   |
|             |   | ComH-2062   | Epidemiology                                     | 3           | 2             | Parallel         | 81       | 2             | 0        | 0   |
| Phar-M2091  | Dosage form Sciences module                   | Phar2091    | Integrated physical pharmacy and pharmaceutics-I | 9           | 5             | Parallel         | 243      | 4             | 1        | 1   |
|             | <b>Semester Total</b>                         |             |  | 29          | 17            |                  |          |               |          |     |

## Year II Semester II

| Module Code | Module Name                                   | Course Code | Course Title                                      | Course ECTS | Course Cr.hr | Mode of delivery | Duration | Perweek (hrs) |          |     |
|-------------|---|-------------|---|-------------|--------------|------------------|----------|---------------|----------|-----|
|             |   |             |   |             |              |                  |          | Lecture       | Tutorial | Lab |
| Phar-M2081  | Pharmacognosy and Alternative Medicine module | Phar2082    | Pharmacognosy                                     | 7           | 4            | Block            | 189      | 6             | 1        | 1   |
|             |   | Phar2083    | Complementary and alternative medicine            | 3           | 2            | Block            | 81       | 4             | 0        | 0   |
| Phar-M2091  | Dosage form Sciences module                   | Phar2092    | Integrated physical pharmacy and pharmaceutics-II | 9           | 5            | Parallel         | 243      | 4             | 1        | 1   |
| Phar-M2101  | Pharmacology Module                           | Phar2101    | Pharmacology-I                                    | 7           | 4            | Parallel         | 189      | 3             | 1        | 1   |
| Phar-M2111  | Medicinal Chemistry                           | Phar2111    | Medicinal chemistry-I                             | 7           | 4            | Parallel         | 189      | 4             | 1        | 0   |
|             | <b>Semester Total</b>                         |             |   | 33          | 19           |                  |          |               |          |     |

### Year III Semester I

| Module Code | Module Name                 | Course Code | Course Title                          | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Per week (hrs) |          |            |
|-------------|-----------------------------|-------------|---------------------------------------|-------------|---------------|------------------|----------|----------------|----------|------------|
|             |                             |             |                                       |             |               |                  |          | Lecture        | Tutorial | Lab/practi |
| Phar-M2101  | Pharmacology Module         | Phar3102    | Pharmacology-II                       | 7           | 4             | Parallel         | 189      | 3              | 1        | 1          |
|             |                             | Phar3103    | Applied toxicology                    | 3           | 2             | Parallel         | 81       | 2              | 0        | 0          |
| Phar-M4161  | Pharmacotherapeutics Module | Phar4161    | Integrated therapeutics-I             | 7           | 4             | Parallel         | 189      | 3              | 1        | 1          |
| Phar-M3131  | Pharmaceutical Technology   | Phar3132    | Immunological and biological products | 3           | 2             | Parallel         | 81       | 2              | 0        | 0          |
| PharM3111   | Medicinal Chemistry         | Phar3112    | Medicinal chemistry-II                | 5           | 3             | Parallel         | 135      | 3              | 0        | 0          |
| Phar-M3121  | Pharmaceutical Analysis     | Phar3121    | Pharmaceutical analysis-I             | 7           | 4             | Parallel         | 189      | 3              | 1        | 1          |
|             | <b>Semester Total</b>       |             |                                       | 32          | 19            |                  |          |                |          |            |

### Year III Semester II

| Module Code | Module Name                                    | Course Code | Course Title                                   | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Per week (hrs) |          |     |
|-------------|--|-------------|--|-------------|---------------|------------------|----------|----------------|----------|-----|
|             |  |             |  |             |               |                  |          | Lecture        | Tutorial | Lab |
| Phar-M4161  | Pharmacotherapeutics Module                    | Phar4162    | Integrated therapeutics-II                     | 7           | 4             | Parallel         | 189      | 3              | 1        | 1   |
| Phar-M3121  | Pharmaceutical Analysis                        | Phar3122    | Pharmaceutical analysis-II                     | 7           | 4             | Parallel         | 189      | 3              | 1        | 1   |
| Phar-M3141  | Social and administrative pharmacy module      | Phar3142    | Introduction to pharmacoeconomics              | 5           | 3             | Parallel         | 135      | 3              | 1        | 0   |
|             |  | Phar3144    | Drug supply management                         | 5           | 3             | Parallel         | 135      | 3              | 0        | 0   |
| Phar-M3151  | Biopharmaceutics and Clinical Pharmacokinetics | Phar3151    | Biopharmaceutics and Clinical Pharmacokinetics | 7           | 4             | Parallel         | 189      | 4hr            | 1        | 0   |
|             | <b>Semester Total</b>                          |             |  | 31          | 18            |                  |          |                |          |     |

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### Year IV Semester I

| Module Code | Module Name                 | Course Code | Course Title                         | Course ECTS | Course Cr. Hrs | Mode of delivery | Duration | Perweek (hrs) |          |          |
|-------------|-----------------------------|-------------|--------------------------------------|-------------|----------------|------------------|----------|---------------|----------|----------|
|             |                             |             |                                      |             |                |                  |          | Lecture       | Tutorial | Practice |
| Phar-M4161  | Pharmacotherapeutics Module | Phar4163    | Integrated therapeutics-III          | 7           | 4              | Parallel         | 189      | 3             | 1        | 1        |
| Phar-M3131  | Pharmaceutical Technology   | Phar3131    | Industrial pharmacy                  | 7           | 4              | Parallel         | 189      | 3             | 1        | 1        |
| Phar-M4171  | Pharmacy practice module    | Phar4171    | Drug informatics                     | 3           | 2              | Parallel         | 81       | 2             | 0        | 0        |
|             |                             | Phar4172    | Communication skills for pharmacists | 3           | 2              | Parallel         | 81       | 2             | 0        | 0        |
|             |                             | Phar4173    | Pharmacy law and ethics              | 3           | 2              | Blocked          | 81       | 4             | 0        | 0        |
|             |                             | Phar4174    | Pharmacy practice-I                  | 5           | 3              | Parallel         | 135      | 3             | 0        | 0        |
|             |                             | Nurs4176    | First aid                            | 3           | 2              | Blocked          | 81       | 4             | 0        | 0        |
|             | <b>Semester Total</b>       |             |                                      | 31          | 19             |                  |          |               |          |          |

### Year IV Semester II

| Module Code | Module Name                               | Course Code | Course Title                               | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Perweek (hrs) |          |          |
|-------------|---|-------------|--|-------------|---------------|------------------|----------|---------------|----------|----------|
|             |   |             |  |             |               |                  |          | Lecture       | Tutorial | Practice |
| Phar-M4161  | Pharmacotherapeutics Module               | Phar4164    | Integrated therapeutics-IV                 | 7           | 4             | Parallel         | 189      | 3             | 1        | 1        |
| Phar-M3141  | Social and administrative pharmacy module | Com-H3141   | Health service management and policies     | 5           | 3             | Parallel         | 81       | 3             | 0        | 0        |
|             |   | Phar3143    | Medical supplies, equipment's and reagents | 2           | 1             | Parallel         | 54       | 1             | 0        | 0        |
| Phar-M4171  | Pharmacy practice module                  | Phar4175    | Pharmacy practice-II                       | 5           | 3             | Parallel         | 135      | 0             | 0        | 3        |
|             |   | Com-H4177   | Nutrition                                  | 3           | 2             | Blocked          | 81       | 4             | 0        | 0        |
| Phar-M5211  | Pharmaceutical Research                   | Com-H5211   | Research Methods                           | 3           | 2             | Blocked          | 81       | 4             | 0        | 0        |
| Phar-M4182  | Professional Elective Module              | Phar418*    | Professional elective course               | 5           | 3             | Parallel         | 135      | 3             | 1        | 0        |
| Phar-M4161  | Pharmacotherapeutics Module               | Phyd4165    | Physical Assessment                        | 2           | 1             | Block            | 54       | 1             |          |          |
|             | <b>Semester Total</b>                     |             |  | 32          | 19            |                  |          |               |          |          |

## Year V Semester I and II

Final year attachment clerkship will be year based student assessment will be made at the end of the year

| Module Code | Module Name                  | Course Code | Course Title  | Course ECTS | Course Cr.Hrs | Mode of delivery | Duration | Lecture per week |          |          |
|-------------|------------------------------|-------------|---|-------------|---------------|------------------|----------|------------------|----------|----------|
|             |                              |             |   |             |               |                  |          | Lecture          | Tutorial | Practice |
| Phar-M5191  | Pharmacy clerkship           | Phar 5191   | Ambulatory care clerkship                               | 7           | 4             | Parallel         | 189      |                  |          | 4        |
|             |                              | Phar5195    | Pediatric clerkship                                     | 7           | 4             | Parallel         | 189      |                  |          | 4        |
|             |                              | Phar5192    | Drug information service clerkship                      | 3           | 2             | Parallel         | 81       |                  |          | 2        |
|             |                              | Phar5194    | Hospital pharmacy clerkship                             | 5           | 3             | Parallel         | 135      |                  |          | 3        |
|             |                              | Phar5193    | Internal medicine clerkship                             | 7           | 4             | Parallel         | 189      |                  |          | 4        |
| Phar-M5191  | Pharmacy clerkship           | Phar5197    | Psychiatry clerkship                                    | 3           | 2             | Parallel         | 81       |                  |          | 2        |
|             |                              | Phar5198    | Surgery clerkship                                       | 3           | 2             | Parallel         | 81       |                  |          | 2        |
|             |                              | Phar5199    | Community pharmacy clerkship                            | 5           | 3             | Parallel         | 135      |                  |          | 3        |
|             |                              | Phar5196    | Gynecology and obstetrics and family planning clerkship | 3           | 2             | Parallel         | 81       |                  |          | 2        |
| Phar-M5202  | Elective attachment          | Phar520*    | Elective attachment                                     | 3           | 2             | Parallel         | 81       |                  |          | 2        |
| Phar-M5211  | Pharmaceutical Research      | Phar 5212   | Student research project                                | 5           | 3             | Parallel         | 135      |                  |          | 3        |
| ComH-M5221  | <b>Team training program</b> | ComH5221    | Team training program                                   | 7           | 4             | Blocked          | 189      |                  |          | 4        |
|             | <b>Semester Total</b>        |             |   | 58          | 35            |                  |          |                  |          |          |

*\*\* This module sequence applies to nationally harmonized courses. Each university will accommodate courses that reflect their philosophies without affecting the sequence core courses agreed nationally.*



## **MODULE DESCRIPTION**

### **Module 1: English language skill module**

**Module name:** English language skill module

**Module category:** General

**Module code:** Enla-M1014

**Credit point value:** 10 ECTS

**Courses:** Communication English language (Enla1011) (5 ECTS)

Basic writing skill (Enla1012) (5 ECTS)

#### **Module Description**

- The module focuses on enhancing students' language competencies. The first course comprehensively presents students with the opportunity to develop their language skills (Listening, Speaking, Reading, Writing, Vocabulary and Grammar). The course focuses on the development of communication skills of the students both in academic and non-academic contexts. As a result it has a big contribution to the success of students in their other university courses. The second course entirely focuses developing the students' writing skill in both academic and non-academic contexts. Both courses must be given on semester basis as the development of the skills that the courses provide is enhanced with the extension of the period at least to the extent that they can associate them with other courses.

**Module objective:** At the end of this module, students will be able to:

- Involve in various communicative contexts
- Read and understand texts with ease
- Differentiate oral and written discourses
- Listen to conversations (communications) in English and decode message easily
- Write reports (paragraphs, essays) in academic contexts

**Module competency:** Develop writing and communication skills which facilitates university studies

**Mode of delivery:** Parallel

**Module learning teaching methods**

## English Language skill Module Course Syllabi

|                    |  |  |  |  |  |  |
|--------------------|--|--|--|--|--|--|
| Course title /code | Communicative English Skills (EnLa 1011)   |  |  |  |  |  |
| Course ECTS        | 5 ECTS (135hrs)  |  |  |  |  |  |
| Mode of delivery   | Classroom contact/Lecture, group work, interactive tutorial sessions (group and pair work/discussions and individual work (independent learning)). |  |  |  |  |  |

| Course Hours | Lecture | Tutorial | Group Work | Assessment | Home study Individual work | Total   |
|--------------|---------|----------|------------|------------|----------------------------|---------|
|              | 48 hrs  | 7 hrs    | 10hrs      | 20 hrs     | 50hrs                      | 135 hrs |

### Course objectives

Upon completing the course, students will be able to:

- ✓ Express their ideas in various communicative contexts (in group/ pair discussion, in public speaking settings)
- ✓ Present oral reports
- ✓ Write short reports
- ✓ Read various materials and make their own notes
- ✓ Identify the structure of oral and written discourses
- ✓ Attend their academic work at ease and with clarity

### Course Description

This course is intended to develop and improve students' language competence. This course is aimed at developing trainees' communicative abilities in English which will help students to develop their communicative skills and overall language competence in English. Generally, this course will cover the specific language aspects described below. Developing basic functions of English language skills: reading (scanning, skimming, reading for details, summarizing, understanding the structure of a text); listening (listening for the gist, listening for details, recognizing discourse markers, noticing the structure of a lecture, understanding speaker intentions, recognizing signposting, attending and following skills); writing (summarizing a text, synthesizing choppy sentences, writing argumentative texts, writing research report, writing a project report); speaking (introducing oneself and others, interviewing, discussions, stating and supporting propositions, stating one's opinions, organizing and taking part in a debate, making a persuasive speech, questioning); vocabulary (working out meanings from context, synonyms, antonyms, collocations, definitions); grammar (relative clauses, modals, voice, conditionals, tense, reported speech).

### Pre-requisite

None

| Weeks                 | Study Hours  | Main Topic/Sub topic/s/ Chapter  | Reading material /assignments   | Student Activities  |
|-----------------------|--|--|---|---|
| 1st                   | Lecture Hours= 2hrs<br>Home Study= 2hrs<br>Discussion = 4hrs | 1.Introductory Unit<br>1.1. Listening and Speaking: Finding out about other people<br>1.2. Vocabulary: Learning to learn vocabulary<br>1.3. Grammar: Learning to use grammar for facilitating meaning  | <i>College English VL.I PP 4-10</i><br><br><i>English Communicative Grammar pp 34-48</i>  | - Introduce themselves to their partners<br><br>-find out information about others  |
| 2nd                   | LH= 2hrs<br>DH= 2hrs<br>PH= 2hrs<br>HS=2hrs                  | 1.4. Reading: What is involved in understanding text?<br>1.5. Speaking: Introducing oneself and others<br>1.6. Writing: A short Personal description or story  | - College English VL.I<br><br>- Communicative English Skills II-unpublished<br>- Writer's Choice  | -Participate in group discussions<br>introduce themselves<br>write a personal description   |
| 3rd & 4 <sup>th</sup> | LH= 4hrs<br>HS=6hrs<br>DH= 6hrs                              | 2.AIDS<br>2.1. Listening and Speaking:<br>2.1.1. Understanding markers of addition and relating<br>2.1.2. Listening for gist<br>2.1.3. Responding to the speaker's purpose<br>2.1.4. Writing a brief summary of a talk<br>2.2. Vocabulary<br>2.2.1. Using component parts of a word as clues to meaning<br>2.2.2. Using topic relationships in order to learn words<br>2.2.3. Being aware of how words collocate with each other<br>2.2.4. Working out word meanings from context<br>2.3. Grammar<br>2.3.1. Using relative clauses<br>2.3.2. Expressing warning and advice | College English-Teacher's Guide<br><br>College Reading + McCarthy<br><br>Advanced Grammar in Use + Grammar for English Language Teachers 350-79<br><br>College English VL.I<br>College English VL.I | Listen to texts and identify markers of addition and relating,<br><br>identify the gist of the talk, write summary of the talk<br>-guess the meaning of words depending on clues, topic relationship and collocation<br><br>- |

|                                      |   |   |  |   |
|--------------------------------------|---|---|--|---|
| 5 <sup>th</sup> & 6 <sup>th</sup>    | LH=4hrs<br>DH=4hrs<br>PH=4hrs<br>HS= 4hrs | <p>2.4 Reading</p> <p>2.4.1. Identifying the intended audience of a text and other critical reading skills</p> <p>2.4.2. Relating a diagram to a text</p> <p>2.5 Speaking</p> <p>2.4.3. Brain storming</p> <p>2.4.4. Public speaking</p> <p>2.6 Writing: Writing a short summary of a talk</p>  | <p>College English VL.I +</p> <p>Public Speaking for College and Career</p> <p>College English VL.I</p>                  | <p>-read passages and work on comprehension questions</p> <p>-practice and present public speeches</p> <p>write summary of a talk</p>   |
| 7 <sup>th</sup> & 8 <sup>th</sup>    | SH=6hrs<br>LH=4hrs<br>DH=6hrs             | <p>3.Culture and Values</p> <p>3.1. Listening and Speaking</p> <p>3.1.1. Identifying the structure of a talk</p> <p>3.1.2. Completing a note framework</p> <p>3.2. Vocabulary</p> <p>3.2.1. Using topic relationships to learn new words</p> <p>3.2.2. Words of Greek and Latin origin</p> <p>3.2.3. Using a vocabulary network to learn words</p> <p>3.3. Grammar</p> <p>3.3.1.Using active and passive constructions for descriptive writing</p> <p>3.3.2. using time clauses for descriptive writing</p> | <p>College English-Teacher's Guide</p> <p>College English VL.I</p> <p>Grammar for English Language Teachers p.287</p>    | <p>Listen to texts and identify structure of the talk</p> <p>Guess meaning of words based on their origin and topic relationship</p> <p>Practice using active and passive constructions</p> |
| 9 <sup>th</sup> and 10 <sup>th</sup> | SH= 4<br>DH= 5<br>LH= 4<br>PH=3           | <p>3.4. Reading</p> <p>3.4.1. Critical reading</p> <p>3.4.2. Reading for main ideas</p> <p>3.4.3. Reading for detail</p> <p>3.5. Speaking</p> <p>3.5.1. Understanding reference</p> <p>3.5.2. Brainstorming</p> <p>3.5.3. Organizing and taking part in a debate</p> <p>3.6. Writing</p> <p>3.6.1. Writing a brief summary of key ideas from a text</p> <p>3.6.2. Writing a descriptive essay about a marriage ceremony</p>   | <p>College English VL.I</p> <p>Public Speaking for College and Career</p> <p>Writer's Choice + Essentials of Writing</p> | <p>-read passage and identify main idea and specific details</p> <p>-participate in debating organized in the classroom</p> <p>-write summary and descriptive paragraph</p>                 |

|                                       |                                |  |  |  |
|---------------------------------------|--------------------------------|--|--|--|
| 11 <sup>th</sup> and 12 <sup>th</sup> | LH=5hrs<br>HS=5hrs<br>DH= 6hrs | 4.Improving Study Practices<br>4.1. Listening and speaking<br>4.1.1. Thinking about what you do when you listen to a lecture and take notes<br>4.1.2. Understanding listing and sequencing markers<br>4.1.3. Listening for a main sections of a talk<br><br>4.2. Vocabulary<br>4.2.1. Using a dictionary<br>4.2.2. Working out word meanings from context<br>4.3. Grammar<br>4.3.1. Using Conditional I,II and III | College English-Teacher's Guide<br><br><br>College Reading + Objective English<br><br>Grammar for English Language Teachers p231 + College English | listen to lectures and take notes<br>identify main sections of a lecture<br><br>work out meaning of words from context<br><br>Practice using conditional clauses |
| 13 <sup>th</sup> & 14 <sup>th</sup>   | LH=5hrs<br>HS=5hrs<br>DH= 6hrs | 4.4. Reading<br>4.4.1. Skimming for gist<br>4.4.2. Critical reading and evaluating<br>4.4.3. Using reference/textual markers<br><br>4.5. Speaking<br>4.5.1. Brainstorming and discussing on what makes a good learner<br><br>4.6 Writing<br>4.6.1. Summarizing a talk<br>4.6.2. Summarizing an academic article<br>4.6.3. Writing an essay on learning English   | College English VL.I<br><br>College English VL. I<br><br>Writers' Choice   | read passage and identify references and textual markers<br><br><br>practice writing summary and essays  |

#### Assessment Mechanisms:

- ✓ Students will be assessed out of 100% in this course. Of which 60% will be allotted for the Continuous Assessment (CA) that will be done throughout the semester. The remaining 40 % will be for the final examination. The CA includes varied types of activities that will allow the students to express themselves like real speaker or communicator. Thus, Students will be assessed continuously at least once in each of the six components. A final exam is administered to assess students'. Break down of the assessment can be seen bellow:

#### Continuous Assessment

- |  |       |     |
|--|-------|-----|
| ➤ Debates                                    |       | 10% |
| ➤ Speech Delivery (2) (Impromptu & Prepared) | (5×2) | 10% |
| ➤ Group Assignment                           |       | 10% |
| ➤ Report (Oral & Written)                    |       | 10% |
| ➤ Summary & Review                           |       | 10% |
| ➤ Listening                                  |       | 10% |
| ➤ Final Examination                          |       | 40% |

## References

- Dean, M.1988. Write it; Writing Skills for intermediate learners of English. Cambridge University Press
- DEFL, 1996.College English: volume I and II.AAU.AAU Printing Press
- Gregory.1999.Public speaking for college and career (Fifth Ed).New York: McGraw Hill College
- Hewings, M. 1999.Advanced Grammar in use: self-study Reference Practice Book for Advanced Learners of English. Cambridge: CUP.
- MOE, 2005.Improve Your English: A Course for Ethiopian Teachers (Grade 1-4)-Face to Face Learner's Books 1&2.Addis Ababa: EMPDE
- Strong, W.1991. Writer's Choice: Grammar and Composition. Illinois: McGraw Hall

Course Title Basic Writing Skills

Course Code Enla 1012

Course ECTS 5ECTS (135hrs)

| Course Hours | Lecture | Tutorial | Group Work | Assessment | Home study Individual work | Total   |
|--------------|---------|----------|------------|------------|----------------------------|---------|
|              | 48 hrs  | 7 hrs    | 10hrs      | 20 hrs     | 50hrs                      | 135 hrs |

Course objectives

Upon completing the course, students will be able to:

- ✓ construct meaningful sentences in English;
- ✓ learn to compose a paragraph that has a clearly stated topic sentence and details ;
- ✓ use appropriate coordination and subordination skills to relate ideas;
- ✓ identify and correct common sentence problems: fragments, comma splices, and run-on sentences, dangling modifiers and agreement errors.
- ✓ Compose paragraphs that have clearly stated topic sentences and supporting details.
- ✓ write a well-structured essay of different types ( descriptive, narrative, expository and argumentative)

Course Description

Sentence level writing: sentence structure, sentence types, functional and structural category, common sentence errors (fragments, comma splices, run-on sentences, dangling modifiers and agreement errors); Paragraph level writing : paragraph, topic sentence and supporting details, structure, essentials of a paragraph, basic types of paragraphs( expository, narrative, descriptive and argumentative ) and techniques of paragraph development; essay level writing : structure of an essay, thesis statement and supporting paragraphs, types of essays and techniques of essay development

Pre-requisite(s)

Communicative English Skills II

| Week | Study Hours                                    | Topics and Sub Topics   | Student Roles and activities  | Required Texts |
|------|--|---|---|----------------|
| 1    | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities: Identifying subject and predicate- Writer's Choice: pp452-454 ( exercise 1-6), A concise Guide to composition page: 124; expanding subject and predicate- Writer's Choice pp455(exercise 7 and 9), Functional category- A concise Guide to composition page: 125</i> | Main worksheet 1<br>page 1-2  |                |
| 2    | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities: structural classification- A Guide to Better Writing pp270-71, Writer's Choice pp502-504(exercise 4-8)</i>   | <i>Practical English Handbook page 15-17, 26-28<br/>Writer's Choice : 451-457, 512 A Guide to Better Writing pp261-269; Writer's Choice 501-505; A concise Guide to composition pp119-122 Main worksheet 1<br/>page 2-5</i> |                |
| 3    | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities: correcting faulty sentences- A concise Guide to composition page: 174-177; Writer's Choice pp513-515(Ex 21-23), College English Writing; pp418-443</i>   | <i>A concise Guide to composition page: Pp129-140<br/>A concise Guide to composition page: Pp129-140<br/>Writer's Choice 513-517<br/>Main worksheet 1<br/>page 5-7</i>  |                |
| 4    | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities: correcting faulty sentences- A concise Guide to composition page: 174-177</i>  | <i>Practical English Handbook pp 125-171<br/>Writer's Choice pp 675-<br/>Main worksheet 2<br/>page 1-2<br/>Effective Academic Writing 2 pp 1-8<br/>From Paragraph to Essay pp 3-15<br/>A Guide to Better Writing 83-150</i> |                |
| 5    | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities: correcting faulty sentences- A concise Guide to composition page: 174-177</i>  | <i>Main worksheet 2<br/>page -6<br/>Effective Academic Writing 2 pp9-15<br/>A concise Guide to composition pp28-32</i>  |                |
|      | Lecture: 3hrs<br>Home St: 4hrs<br>Ass'nt: 2hrs | <i>Activities on using punctuation marks<br/>Practical English Handbook pp 125, 128, 131, 136</i>   | <i>A Guide to Better Writing 83-150<br/>Effective Academic Writing 1 pp 30-142; Effective Academic Writing 3 pp88-109<br/>A concise Guide to composition pp32-39</i>  |                |



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| 6  | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | 137,139,144,<br>145,149,15,157(Ex 1-<br>11)Writer's Choice<br>pp675,676,677,679,<br>681,683,686(Ex1-8)  | Main worksheet 2<br>page 7-8<br><br>Main worksheet 3<br>page 1-2<br><i>Effective Academic Writing</i> 2 pp16-26<br><i>Effective Academic Writing</i> 3pp 2-30<br><i>College Writing Skills</i> ; pp 135-145   |
| 7  | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | <i>Activities</i> : Identifying topic<br>sentences and supporting<br>details <i>Effective Academic<br/>Writing</i> pp 3-8(Ex1-8)<br><i>From Paragraph to Essay</i><br>pp 8-9,11,12  | Main worksheet 3<br>page 3-4 <i>Effective Academic Writing</i> 2 pp16-26<br><i>Effective Academic Writing</i> 3pp 2-30 <i>College<br/>Writing Skills</i> ; pp 135-145   |
| 8  | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | <i>Activities</i> : achieving<br>coherence and unity in a<br>paragraph <i>Effective<br/>Academic Writing</i> 2 pp9-14<br><i>A concise Guide to<br/>composition</i> pp40-42  | Main worksheet 3<br>page 3-4 <i>Effective Academic Writing</i> 2 pp16-26<br><i>Effective Academic Writing</i> 3pp 2-30<br><i>College Writing Skills</i> ; pp 135-145<br><br><i>A Guide to Better Writing</i> 165-225<br><i>College Writing Skills</i> ; pp 161-319<br><i>Effective Academic Writing</i> 2pp28-74<br><i>Effective Academic Writing</i> 3pp88-109 |
| 9  | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | <i>Activities</i> : types and<br>methods of paragraph<br>development<br><i>Effective Academic<br/>Writing</i> 1 pp35-37(Ex 4-<br>6),pp56-60(Ex3-5),pp81-<br>83(3-5); <i>A Guide to Better<br/>Writing</i> pp 86-87,89-<br>90,94-95,97-98,102,104-<br>105,110; <i>A concise Guide<br/>to composition</i> pp42-43 |   |
| 10 | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs |   |   |

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| 11 | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | Activities on free and guided writing<br>Main worksheet 2 page 7-8  |  |
| 12 | Lecture:<br>3hrs<br>Home St:<br>4hrs<br>Ass'nt:<br>2hrs | Activities on nature and structure of an essay<br>Effective Academic Writing2 pp17-18,19,25<br>Effective Academic Writing3 pp3-7,10-11<br>A Guide to Better Writing pp170-173,188 Main worksheet 3 page 1-2 |  |
| 13 |   | Activities on nature and structure of an essay, how to write the introduction part  |  |
| 14 |   | Effective Academic Writing3 pp12-19 College Writing Skills; pp138-145 Main worksheet 3 page 3-4   |  |
| 15 |   | Activities on how to write the body and the conclusion and steps on essay writing Activity<br>Effective Academic Writing3 pp10,11<br>College Writing Skills; pp25,27,28,31-32,35-37,38-47                   |  |
| 16 |   | Activities on writing different types of essays<br>Effective Academic Writing2 pp28-31,34-36,37-38,55-63,76-78<br>Effective Academic Writing3pp93-97<br>College Writing Skills; pp189,203-4,220-226         |  |

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|  |  | <i>Activities on writing different types of essays</i><br><i>Effective Academic Writing2 pp28-31,34-36,37-38,55-63,76-78</i><br><i>Effective Academic Writing3pp93-97</i> |  |
|  |  | <i>Activities on writing different types of essays</i><br><i>Effective Academic Writing2 pp28-31,34-36,37-38,55-63,76-78</i><br><i>Effective Academic Writing3pp93-97</i> |  |

**Teaching and learning methods:** Classroom contact/Lecture, group work, interactive tutorial sessions (group and pair work/discussions and individual work (independent learning)).

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| Assessment  | Continuous assessment                              | Competence to be assessed  |
| Students are most frequently evaluated through their written assignments (30%) and classroom quiz (10%). There is also final exam (50%) | 1 quiz and two individual writing assignments 50 % | Skill and knowledge of:  |
|   | Quiz: Sentence level writing (10%) week 3;         | identifying components of a sentence, completing a sentence with appropriate components, identifying types of sentence,                      |
|   | Assignment 1 and 2 Paragraph writing (20%) week 8; | identifying elements of a paragraph, Writing a topic sentence and supporting details and a concluding sentence                               |
|   | Assignment 3 Essay writing (10%) week 12           | identifying and writing a thesis statement, hook, background writing an introductory paragraph, body and conclusion of an essay. of an essay |
|   | Two group writing assignments 20%                  | writing descriptive, expository, narrative and argumentative paragraph   |
|   | Assignment 1 paragraph level writing (10%) week 10 | writing an essay (outlining, drafting, revising, editing)  |
|   | Assignment 2 Essay level writing (10%) week13      |  |

|                                       |   |
|---------------------------------------|---|
| Three Quizzes (15%)                   | identifying and correcting common sentence errors                       |
| Quiz 1 on sentence writing 5% week 4; | identifying types of a paragraphs and methods of developing a paragraph |
| Quiz 2 on paragraph writing 5% week 6 | organizing paragraphs to make a complete essay( unity and coherence)    |
| Quiz 3 on essay writing 5% week 14    |   |
| Final exam      50                    | week 16   |

#### Writer's Choice : Grammar and Composition

#### Reference

Rorabacher ,L *A Concise Guide to Composition* (3<sup>rd</sup> Ed). London Harper and Row publishers(1976)

A Guided Writing to Composition

Langan,J *College Writing Skills. sixth Edition. Boston: Mcgraw-Hill* (2005).

Savage, A.and M. Shafiei,*Effective Academic Writing 1. Oxford: Oxford University Press.* (2007)

Savage, A.and P. Mayer *Effective Academic Writing 2 Mcgraw-Hill* (2005). *Oxford University Press.* (2005)

Davis,J and R,Liss *Effective Academic Writing 3 The Essay. Oxford University Press.* (2005)

## **Module 2: Social Sciences and humanities**

**Module name:** Social sciences and humanities module

**Module category:** General

**Module code:** Sshm-M1024

**Module weight in EtCTS:** 10 ECTS

**Courses:** General Psychology (Psyc1021) (5 ECTS)

Civics & Ethical Education (Cvet1022) (5 ECTS)

**Module description:** the module will try familiarizing students with social, psychological and ethical issues of the society and human being. The module covers key concepts of psychology & civic and ethics.

**Module objective:** to equip students with the psychological ethical approaches to live up ethically with the complex human social life.

**Module competency:**

- Develop skills to enhance students' ability to analyze critically the dynamics of society and current social issues.
- Develop critical thinking and problem solving skills
- Enhance students' Social research skills
- Improve both your communication and group interaction skills
- Gain knowledge about the theoretical discourses and practices of state/government, society and citizenship and their mutual interplay especially in the context of Ethiopia;
- Know the civic, social and political dimension of their citizenship lives in line with the importance of active civic participation of citizens to the healthy life of their state and society;
- Gain the philosophical and communication capacity of dialogue in citizenship discourses via up holding such values as respecting and tolerance of others;
- Develop individual and/or collective potential of becoming self-confident citizens who can effectively participate in their legal-political, socio-economic and cultural lives;
- Understand the historical dynamics and nature of state formation and nation-building in their country alongside with the major problems generated by this process and the efforts lately made such as introducing ideals like constitution, democracy and human rights as remedies;
- Understand the essences of such values and principles as democracy and human rights, multiculturalism and constitution and constitutionalism especially in the context of Ethiopia;
- Examine Ethiopia's experience in constitutional development and issues of democracy and human rights thereof;
- Develop and demonstrate certain ethical values and civic virtues both in the realm of human to human and human to environment relationships;
- Understand the interdependence of Environment and development in light of ethics;
- Develop critical/analytical understanding and reflective skill of identifying global or national level development, democracy/governance and peace related issues of civics and ethics and then be able to produce or evaluate policies and practices in a civically and ethically responsible manner.

- Cultivate certain moral values and civic virtues that enable them be morally matured and civically competent in their professional and citizenry lives by practically exposing them to moral and civic debates/discussions and engagements.
- Develop such values/ virtues as recognition, appreciation and tolerance towards diversity and also build culture of peace when living in a multi-cultural Ethiopia

**Mode of delivery:** Parallel

**Mode of Assessment:**

### **Assessment Criteria**

#### **A. Assessment Criteria**

The assessment criteria are based on continuous assessment of class activities, individual and group assignment, field visit and report writing, test and final exams. This in turn can be broken down in to;

- Group assignments .....30%
- Tests/quizzes .....30%
- Final Exam.....40%
- Total.....100%

### **Learning activities and teaching methods**

#### **A. Learning Activities**

Students are expected to undertake among others the following major learning activities:

- Engage in learning by doing (independent study, group assignments, presentation, report writing, and etc...)
- Participation and note takings during class lectures and debates and discussions;
- Analysis, summarization and presentations of chapter/article, motions on selected issues;

#### **B. Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments,
- Arrange and facilitate seminar sessions by inviting professionals for public lectures or debates on subject related issues.

## **Social sciences and humanities module Course syllabi**

Course Title: General Psychology

Course Code: Psyc 1021

Course EtCTS: 5

Prerequisite course: None

### **Course Description**

- This introductory course will provide students with an overview of the current body of knowledge and methods of the science of psychology. It is a general overview course focusing on the scientific study of both the behavioral and mental processes of human beings and animals. More specifically, topics will be covering: historical foundations of psychology, scientific thoughts in psychology, research methodology, biological basis of behavior, human development, sensation and perception, learning, memory and forgetting, motivation and emotion, personality, psychological disorders and psychotherapy.

### **Course Objectives:**

An overriding course goal is to introduce students about the basic concepts of psychology and to provide access about the ways psychologists apply psychological knowledge, principles, and theories to understand their lives and the lives of others. Toward this goal, upon completion of this course, students will be able to:

- Clearly describe psychological concepts
- Compare and contrast the major perspectives in Psychology
- Explain the various research methods in Psychology
- Recognize the link between human biology and behavior
- Discuss different aspects of human development
- Comprehend how people sense and give meaning to their environment
- Explain the process of learning a new behavior from different theoretical basis
- Elucidate about memory and forgetting processes
- Describe motivational and emotional processes

- Discuss personality theories
- Describe the characteristics of major psychological disorders
- Appreciate the practical value of psychology

#### Schedule of Time, Contents and Reading Materials

| Days | Contact Hrs | Topic/Subtopics/ Chapters   | Reference  | Remark |
|------|-------------|---|--|--------|
| 1    | 3:12 hrs    | Unit 1: Introduction to Psychology<br>1.1. Definition of psychology<br>1.2. The Goals of Psychology<br>1.3. The subject Matter of psychology<br>1.1. Historical development of psychology                         | <ul style="list-style-type: none"> <li>• Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.4-238</li> <li>• Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp1-24</li> </ul>        |        |
| 2    | 3:12 hrs    | 1.2. Perspectives in psychology<br>1.3. Major Areas in psychology<br>1.4. Research Methods in Psychology  |  |        |
| 3    | 3:12 hrs    | Unit 2: Biological Basis of Behaviors<br>2.1. Heredity (gene) Vs Behavior<br>2.2. Nerve system Vs Behavior<br>2.3. Endocrine system Vs Behavior   | <ul style="list-style-type: none"> <li>• Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.39-79</li> <li>• Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp 25-79</li> </ul>      |        |
| 4    | 3:12 hrs    | Unit 3: Human development<br>3.1. The nature of human development<br>2.2. Issues or controversies in development  | <ul style="list-style-type: none"> <li>• Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.331-376</li> <li>• Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp461-126</li> </ul>   |        |
| 5    | 3:12 hrs    | 3.3. Theories of human development <ul style="list-style-type: none"> <li>• cognitive development</li> <li>• psychosexual development</li> <li>• psychosocial development</li> <li>• moral development</li> </ul> |  |        |
| 6    | 3:12 hrs    | Unit 4: Sensations and Perception<br>4.1 Definition: Sensation and Perception<br>4.2 Sensing the environment<br>4.3 Perceptual processes<br>4.3.1 Attention<br>4.3.2 Organization<br>4.3.3 Interpretation         | <ul style="list-style-type: none"> <li>• Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.81-126</li> <li>• Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp 80-136</li> </ul>    |        |
| 7    | 3:12 hrs    | Unit 5: Learning<br>5.1 Definition and characteristics of learning<br>5.2 Theories of learning<br>5.2.1. Pavlov's classical conditioning  | <ul style="list-style-type: none"> <li>• Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.163-201</li> <li>• Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed , Pp 137-180</li> </ul> |        |



|    |          |  |   |  |
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|    |          | 5.2.2. Operant conditioning  |   |  |
| 8  | 3:12 hrs | 5.2.3. Social learning theory<br>5.2.4. Cognitive view of learning   |   |  |
| 9  | 3:12 hrs | Unit 6: Memory and forgetting<br>6.1 Processes of memory<br>6.2 Sensory memory<br>6.3 Short term memory<br>6.4 Long term memory<br>6.5 Theories of forgetting  | <ul style="list-style-type: none"> <li>Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.203-234</li> <li>Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp 181-224</li> </ul> |  |
| 10 | 3:12 hrs | Unit 7: Motivation and Emotion<br>7.1. The nature of motivation<br>7.2. Theories of motivation<br>7.3. Conflict motives & frustration<br>7.4. Definition of emotions<br>7.5. Components of emotion<br>7.6. Theories of emotion | <ul style="list-style-type: none"> <li>Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.293-330</li> <li>Morgan C. (1999). Introduction to Psychology. 6<sup>th</sup> ed. Pp 265-306</li> </ul> |  |
| 11 | 3:12 hrs | Unit 8: Stress and Coping mechanisms<br>8.1. The nature of stress<br>8.2. Sources of stress (stressors)<br>8.3. Coping mechanisms of stress  | <ul style="list-style-type: none"> <li>Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.411-451</li> <li>Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp307-338</li> </ul>  |  |
| 12 | 3:12 hrs | Unit 9: Personality<br>9.1. The nature of personality<br>9.2. Theories of personality  | <ul style="list-style-type: none"> <li>Robert S. Feldman (1996). Essentials of Understanding psychology. Pp379-409</li> </ul>   |  |
| 13 | 3:12 hrs | 9.3. The measurement of personality<br>Unit 10: Abnormal Behaviors and psychotherapy<br>10.1. Criteria/approaches of abnormality   | <ul style="list-style-type: none"> <li>Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp 563-611</li> <li>Robert S. Feldman (1996). Essentials of Understanding psychology. Pp.411-451</li> </ul> |  |
| 14 | 3:12 hrs | 10.2. Classifications of abnormal behaviors<br>10.3. Treatment of psychological disorders  | <ul style="list-style-type: none"> <li>Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed. Pp-612-724</li> </ul>   |  |
| 15 | 3:12 hrs | Exam Preparation week  |   |  |

Mode of Delivery:

| Method                       | Hrs |
|------------------------------|-----|
| Lectures                     | 48  |
| Group discussion             | 20  |
| Presentation                 | 14  |
| Tutorial and problem solving | 10  |
| Independent study            | 35  |
| Assessment                   | 8   |
| Total                        | 135 |

### Assessment Method

Dominantly, there will be formative continuous assessment (quizzes, individual and group work, discussion, class activity, assignments) just at the end of each week. Moreover, summative assessments such as mid semester and final examination will be carried out.

### Assessment Arrangement

|   |     |
|---|-----|
| Quizzes/Tests                                   | 20% |
| Group/ individual Assignments with presentation | 30% |
| Class participation and attendance              | 10% |
| Final Examination                               | 40% |

### References

- Feldman, R.S. (1999). Essentials of Understanding psychology: McGraw Hill college
- Lahey, B. (2004) Psychology: An Introduction (8<sup>th</sup> ed.) Boston: McGraw Hill Book Company.
- Morgan C. (2003). Introduction to Psychology. 6<sup>th</sup> ed McGraw Hill Book Company
- McMahon, J, McMahon, F, and Ramano, T. (1995). Psychology & you (2<sup>nd</sup> ed.) New York: McGraw Hill Book Company.
- Miles H., Frank D. and Jonathan F. (2005). Psychology. Alden Press, Oxford, UK.
- Note: Students are also recommended to read other possible sources like the research articles, newsletters, magazines, etc

Course ECTS Credit 5 ECTS

|                  |      |
|------------------|------|
| Pre-requisite(s) | None |
|------------------|------|

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| Course objective and competences to be acquired | <p>At the end of the course, students will be able to</p> <ul style="list-style-type: none"> <li>• know key concepts like civics, ethics and profession;</li> <li>• explain government institutions, policies, strategies and legal provisions of your country;</li> <li>• analyze the dynamics of socio-economic and political transformations of your country;</li> <li>• comprehend the foundations of democracy and good governance and tools of democratization process;</li> <li>• gain an increased awareness of the opportunities and challenges of globalization</li> </ul> |
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|-------|----------------------|---|---|---|
|       | 2 hrs<br>(afternoon) | <p>Profession and Professional Ethics in Ethiopia; What is profession; and who are professionals?</p> <p>Distinguishing Features of profession</p>          | <p>Bayles (1989), pp 6-18<br/><i>Civics and Ethics Teaching Material</i>, Module , Chapter One, pp 9-29</p>   | <p>Students reflect on the meaning of profession, and elements that are to be considered in defining profession</p> <p>Identifying the distinguishing features of profession; and enumerating the attributes of ethical and moral principles of profession will be made by students</p> |
| Day 2 | ½ hrs<br>(morning)   | Quiz-I  |   |   |
|       | 2 hrs<br>(morning)   | <p>CHAPTER TWO</p> <p>Perspectives on Society, state and government,</p> <p>Definition and essential elements of state, theories on the origin of state</p> | <p><i>Teaching Material</i>, Module</p> <p>Johari, J.C (1987), pp 1-20</p> <p>The 1933 Montevideo Convention on the Rights and Duties of States</p> <p><i>Civics and Ethics Teaching Material</i>, Module , Chapter Two, pp 30-34</p> | <p>Students reflect on the meaning of, Society, state and government and the triangular relationship among them. Students describe the elements of modern state and reflect views on theories on the origin of state.</p>   |
|       | 4 hrs<br>(afternoon) | Structures of State, Forms of Government  | <p><i>Teaching Material</i>, Module , Chapter Two, pp 34-44</p>   | <p>Identify the two structures of state.</p> <p>Compare and contrast the structures of state in Ethiopian context.</p> <p>Reflect view on the different forms of government, emphasis on parliamentary and presidential systems as well as sovereignty.</p>                             |
| Day 3 | 3 hrs                | Tutorial-I  |   |   |
| Day 4 | 4hrs<br>(morning)    | Society, State and Government in Ethiopia.  | <p><i>Civics and Ethics Teaching Material</i>, Module , Chapter Two, pp 44-73</p> <p>Johari, J.C (1987), pp 1-20</p> <p>The 1933 Montevideo Convention on the Rights and Duties of States</p>   | <p>Reflect view on the form and structure of the successive Governments of Ethiopia</p> <p>Discuss the state-society relations of successive governments of Ethiopia</p> <p>Students reflect their views on rationales and dynamics of federalism in Ethiopia.</p>                      |
|       |                      | Chapter Three: Citizenship, Patriotism and civic  | <i>Civics and Ethics Teaching</i>   | Students understand the concepts of   |

|           |                            |   |  |   |
|-----------|----------------------------|---|--|---|
|           |                            | Participation.<br><br>Definition of Citizenship, Historical survey of Citizenship, aspects of Citizenship, qualifications for citizenship: ways of acquiring and losing citizenship | <i>Material</i> , Module , Chapter Three, pp 74-89   | citizen and citizenship;<br><br>Discuss on the historical survey of citizenship;<br><br>Explain the aspects of citizenship;<br><br>Know ways of acquiring and losing citizenship;   |
|           | 4hrs<br>(afternoon)        | The rights and Duties of Citizens, Citizenship and Patriotism in the Ethiopian Context, Civic Participation.  | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Three, pp 89-112<br><br>FDRE constitution (Articles 13 -44), Protections of Nationality under the 2003 Nationality Proclamation Articles 14-17)<br><br>Criminal Code of Ethiopia (Arts 561-600 | To assess students’ ability to know their rights and duties as well as governments’ rights over them and duties towards; identify their responsibilities towards their community.<br><br>Explain the concept of patriotism and its linkage with citizenship<br><br>Describe the forms and forums of civic participation |
| Day 5     | ½ hr<br>(afternoon)        | Quiz-II   |  |   |
| Day 6 & 7 | 1 <sup>st</sup> Week Break |   |  |   |
| Day 8     | 3 hrs                      | Tutorial-II   |  |   |
| Day 9     | 4hrs<br>(morning)          | CHAPTER FOUR: Democracy and Good Governance in Ethiopia<br><br>Definition and the Historical Survey of Democracy, Forms and Types of democracy                                      | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Four, pp 113-116   | Students reflect their views on the concept and meaning of democracy; Describe the forms and types of democracy   |
|           |                            | Fundamental principles and values of democracy, Actors in the democratization process   | <i>Civics and Ethics Teaching Material</i> , Module Chapter Four, pp 116-133<br><br>FDRE constitutions , basic principles of the constitution, (Articles 8-12)   | List down the basic fundamental values and principles of democracy; Evaluate the role of different actors in the democratization process  |

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|--------|----------------------------|--|--|---|
|        | 4hrs<br>(afternoon)        | Democracy and good governance in the context of Africa and Ethiopia.   | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Four, pp 133-137<br><br>Johari, J.C (1987 ) pp95-122                         | After introducing the foundations of democracy in general, students reflect their views on foundations of democracy in Africa and Ethiopia; attributes of good governance, the conditions required for a political system to qualify as a democracy   |
| Day 10 | ½ hrs<br>(afternoon)       | Quiz-III   |  |   |
| Day 11 | 3hrs<br>(morning)          | Tutorial-III   |  |   |
|        | 4hrs<br>(afternoon)        | Chapter five: Constitution and constitutionalism<br><br>Definition of constitution, definition of constitutionalism, purposes and classification of constitution, Contents and validity of constitution, | <i>Civics and Ethics Teaching Material</i> , Module Chapter five, pp 138-146   | Students identify the basic features of constitution and constitutionalism; list the major purposes and function of constitution; appreciate why countries needs to have constitution ;distinguish modern classification of constitutions; describe the contents and validity of constitution |
|        |                            | The Constitutional Experience of Ethiopia, the pre-1931 traditional constitutional experience, The 1931 Constitution, The 1955 Revised Constitution.   | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Five, pp 146-153<br><br>The 1931 constitution, the Revised 1955 Constitution | The students evaluate the major achievements of traditional constitution of Ethiopia; explain the motives and progressive political elements of the 1931 and the 1955 Ethiopian constitution; compare the 1931 and the 1955 revised constitution.   |
| Day 12 | ½ hr<br>(afternoon)        | Quiz IV  |  |   |
| 13-14  | 2 <sup>nd</sup> Week Break |  |  |   |
| Day 15 | 3hrs<br>(morning)          | Tutorial-IV  |  |   |
|        | 4hrs<br>(afternoon)        | The 1987 PDRE Constitution, the Transitional Charter of 1991, The 1995 FDRE Constitution.  | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Five, pp 153-163. The 1987 PDRE constitution and The 1995 FDRE constitution. | The students reflect their views on the silent features of the 1987 PDRE constitution; 1991 Transitional Charter and 1995 FDRE constitution; Compare and contrast the ideological basis of Ethiopian constitutions under the three successive regimes.  |

|        |                      |  |  |  |
|--------|----------------------|--|--|--|
| Day 16 | 4hrs<br>(morning)    | CHAPTER SIX :<br>Globalization<br><br>Introduction, Globalization and the changing world, dimensions and values of globalization, major actors of globalization. | <i>Civics and Ethics Teaching Material</i> , Module , Chapter Six, pp 164-180<br><br>Douglas, S., and Y. Wind (1987)<br><br><i>The Myth of Globalization</i> . NY: www.ingentaconnect.com/content/mcb/036/2001 | Identify the major value cracks which are believed to supply the ever worsening value crises over work as a spiritual and material source of ethical problems in Ethiopia. |
|        | 4 hrs<br>(afternoon) | Challenges of globalization in developing countries, Ethiopia; a state in a globalized world, Global citizenship   | <i>Civics and Ethics Teaching Material</i> , Module, Chapter Six, pp 180-187<br><br>Swann, D. (1999) <i>The Economics of the Common Market</i> , 6th ed., London: Penguin Books                                | Reflect views on the meaning by globalization and its drivers  |
| Day 17 |                      | One day break for final exam preparation   |  |  |

**Course Delivery Mode** The mode of the delivery of the course includes lecture, tutorials, home study, group discussions, intensive readings, role play and class debates, independent assignments. Based on these methodologies of teaching, the course should have highly participatory that helps students to develop habits of critical thinking, inquisitive, critical, analytic, integrative and morally balanced student, and exhibits higher ethical standards like open-mindedness, rational thinking, evidence-oriented personality and problem solving skills.

**Assessment** Evaluation will be made based on continuous assessment (50%) and final exam (50%) results. The continuous assessment comprises group and individual assignments, presentation, class attendance and participation, and quizzes. In all kinds of assessments students are expected to clearly demonstrate their horizon of thinking, rational reasoning proper use of language by ensuring clear, effective and meaningful communication.

|                  |   |   |
|------------------|---|---|
| <b>Mechanism</b> | <p>1. Continuous assessment</p> <p>Group assignment with presentation ..... 20%</p> <p>Quiz I Day 2 ..... 10%</p> <p>Quiz II Day 5 ..... 10%</p> <p>Quiz III Day 10 ..... 10%</p> <p>Quiz IV Day 12 ..... 10%</p> <p>Final exam Day 18..... 40%</p> | <p>Competence to be measured</p> <p>(Knowledge, skill and attitude)</p> <ul style="list-style-type: none"> <li>Describing key concepts like civics, ethics, democracy, profession and so on; institutions, policies, strategies and legal provisions of the country;</li> <li>Explaining their rights and duties as well as governments' rights over them and duties towards them.</li> <li>Demonstrating their understanding of government institutions, policies, strategies and legal provisions of their country</li> </ul> |
|------------------|---|---|

**Reference**

- Assefa Fiseha (2005) *Federalism and the Accommodation of Diversity in Ethiopia: A Comparative Study*, Netherlands, Wolf Legal Publishers.
- Bayles, Michael (1989). *Professional Ethics*. 2d ed. Belmont, Calif : Wadsworth.

3. Bahru Zewde, (1991), *A History of Modern Ethiopia: 1855-1974*. Addis Ababa: AUU Press.
4. Clapham, C., *Haile-Sellase's Government*, (London: Longman, 1969).
5. Fasil Nahum (1997), *Constitution for a Nation of Nations: The Ethiopian Prospect*. Asmara: The Red Sea press.
6. Johari, J.C (1987) *Contemporary Political Theory: Now Dimensions, Basic Concepts and major Trends*. New Delhi: Sterling publishers Put. Ltd.
7. Kassahun Berhanu (1998) 'Democracy, State-Building and Nations in Ethiopia: 1974-1995.' In Gros, Jean- Germain (ed.) *Democratization in Late Twentieth- Century Africa coping with Uncertainty*.
8. Merera Gudina, (2003) *Ethiopia: Competing Ethnic Nationalities and the Quest for Democracy, 1960-2000*. Chamber printing house: Addis Ababa
9. Tesfaye Molla (2010) *Civics and Ethics Distance Learning Material*, Hawassa University, Department of Governance and Development Studies.
10. Tsegaye Regassa, (2001). *Ethnic Federalism and The Right to Self-Determination As A Constitutional Legal Solution to the Problem of Multi-Ethnic Societies: The Case of Ethiopia* (LLM Thesis, Ethiopian Civil Service College, Law Library, Unpublished) Policy/legal Documents
11. The Federal Democratic Republic of Ethiopia Constitution of 1995 Proclamation No. 1/1995, 21<sup>st</sup> August, 1995, adopted on 8<sup>th</sup> of December



### **Module 3: Biomedical Sciences-I**

**Module name:** Biomedical science I

**Module category:** Basic

**Module code:** Biom-M1033

**Module number:** 03

**Module weight in EtCTS:** 17

**Courses:** Anatomy and histology (Anat1031) (7 EtCTS)

Human physiology I (Phyll032) (5 EtCTS)

Human physiology II (Phyll033) (5 EtCTS)

#### **Module description**

Biomedical science I module emphasizes on structural organization of the human body at the gross (macroscopic) and histological (microscopic) level and also it addresses basic understanding of the function and regulation of the systems and organs of the human body. It will be delivered over a period of 2 semesters.

**Module objective:** The module is designed to provide students with a basic understanding of the structure, function and regulation of the human body

**Module competency:** Apply the normal anatomic and physiologic conditions of the human body to understand drugs effect

**Module Mode of delivery:** Block

#### **Module learning teaching methods**

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group & individual presentation, assignment, project work, and laboratory work.

#### **Module Assessment techniques:**

Quizzes

Mid exam

Final Exam

Seminar

Laboratory

Assignment

## Biomedical Sciences-I module courses syllabi

|                     |                                    |
|---------------------|------------------------------------|
| <b>Course title</b> | <b>Human anatomy and Histology</b> |
| Course code         | Anat 1031                          |
| Pre-requisite       | None                               |
| Course EtCTS        | 7                                  |
| Course Hours        | 189 hours                          |

### Course Description

- This course covers the facts and concepts of human anatomy, intended for application to Pharmacy practice. The major goal is to enable students to increase knowledge and build upon their professional skills through understanding the relationships of the human body structure & their clinical relevance, in general.

### Course objectives

| Week | Contact hrs | Topic/sub topic/chapter |
|------|-------------|-------------------------|
|------|-------------|-------------------------|

|      |  |                                       |
|------|--|---------------------------------------|
| 2hrs |  | Unit -1 Introduction to human Anatomy |
|------|--|---------------------------------------|

|  |  |   |
|--|--|---|
|  |  | 1.1. History, Definition and Divisions of Anatomy |
|--|--|---|

|  |  |                        |
|--|--|------------------------|
|  |  | ➡ Divisions of Anatomy |
|--|--|------------------------|

|  |  |  |
|--|--|--|
|  |  | a. Gross anatomy (Macroscopic anatomy) |
|--|--|--|

|  |  |                    |
|--|--|--------------------|
|  |  | ○ Systemic anatomy |
|--|--|--------------------|

|  |  |                    |
|--|--|--------------------|
|  |  | ○ Regional anatomy |
|--|--|--------------------|

|  |  |                        |
|--|--|------------------------|
|  |  | b. Microscopic anatomy |
|--|--|------------------------|

|  |  |                                 |
|--|--|---------------------------------|
|  |  | ➡ Other subdivisions of anatomy |
|--|--|---------------------------------|

|  |  |                              |
|--|--|------------------------------|
|  |  | ◆ Applied (Clinical) anatomy |
|--|--|------------------------------|

|  |  |                    |
|--|--|--------------------|
|  |  | ◆ Surgical anatomy |
|--|--|--------------------|

|  |  |                   |
|--|--|-------------------|
|  |  | ◆ Surface anatomy |
|--|--|-------------------|

|  |  |                        |
|--|--|------------------------|
|  |  | ◆ Radiological anatomy |
|--|--|------------------------|

|  |  |                               |
|--|--|-------------------------------|
|  |  | 1.2. Anatomical terminologies |
|--|--|-------------------------------|

|  |  |  |
|--|--|--|
|  |  | 1.3. Body Parts, Views, Planes and Body Movement |
|--|--|--|

|  |  |                            |
|--|--|----------------------------|
|  |  | 1.3.1 Anatomical positions |
|--|--|----------------------------|

|  |  |                                      |
|--|--|--------------------------------------|
|  |  | 1.3.2 Anatomical planes and sections |
|--|--|--------------------------------------|

|  |  |                     |
|--|--|---------------------|
|  |  | ✚ Anatomical planes |
|--|--|---------------------|

|  |  |                           |
|--|--|---------------------------|
|  |  | ♠ Frontal (coronal) plane |
|--|--|---------------------------|

|  |  |                   |
|--|--|-------------------|
|  |  | ♠ Sagittal planes |
|--|--|-------------------|

|  |  |                              |
|--|--|------------------------------|
|  |  | ♠ Median (Midsagittal) plane |
|--|--|------------------------------|

|  |  |                    |
|--|--|--------------------|
|  |  | ♠ Transverse Plane |
|--|--|--------------------|

|  |  |                       |
|--|--|-----------------------|
|  |  | ✚ Anatomical sections |
|--|--|-----------------------|

|  |  |   |
|--|--|---|
|  |  | ♠ Coronal, median, horizontal, longitudinal, oblique, and cross-sections. |
|--|--|---|

|     |  |                                    |
|-----|--|------------------------------------|
| 1hr |  | 1.3.3 Directional terms in Anatomy |
|-----|--|------------------------------------|

|  |  |                                   |
|--|--|-----------------------------------|
|  |  | *Terms of relationship (position) |
|--|--|-----------------------------------|

|                 |  |                    |
|-----------------|--|--------------------|
| 1 <sup>st</sup> |  | *Terms of movement |
|-----------------|--|--------------------|

|  |  |                                       |
|--|--|---------------------------------------|
|  |  | 1.4. Body regions and regional names. |
|--|--|---------------------------------------|

|  |  |                |
|--|--|----------------|
|  |  | ✚ Body regions |
|--|--|----------------|

|  |  |                          |
|--|--|--------------------------|
|  |  | ◆ abdominopelvic regions |
|--|--|--------------------------|

|  |  |                            |
|--|--|----------------------------|
|  |  | ◆ abdominopelvic quadrants |
|--|--|----------------------------|

|  |  |                  |
|--|--|------------------|
|  |  | ✚ Regional names |
|--|--|------------------|

|  |  |            |
|--|--|------------|
|  |  | ○ The head |
|--|--|------------|

|  |  |            |
|--|--|------------|
|  |  | ○ The Neck |
|--|--|------------|

|  |  |             |
|--|--|-------------|
|  |  | ○ The trunk |
|--|--|-------------|




|  |  |                  |
|--|--|------------------|
|  |  | ○ The upper limb |
|--|--|------------------|

|                 |     |  |
|-----------------|-----|--|
|                 |     | ○ The lower limb   |
|                 |     | 1.5. Body cavities and membranes                                     |
|                 |     | ✚ Body cavities  |
|                 |     | ♣ Dorsal /posterior  |
|                 |     | ▶ cranial cavities   |
|                 |     | ▶ Vertebral cavity   |
| 1hr             |     | ♣ Ventral/anterior body cavities                                     |
|                 |     | ▶ Thoracic cavity  |
|                 |     | ▶ The Abdominopelvic cavity  |
|                 |     | 1.6 Levels of structural organization                                |
| 1 <sup>st</sup> |     | ▶ Chemical level of organization                                     |
|                 |     | ▶ The cellular levels of structural organization                     |
|                 |     | ▶ The tissue levels of organization                                  |
|                 |     | ▶ The organ levels of organization                                   |
|                 |     | ▶ The system levels  |
|                 |     | ▶ The organismal level   |
|                 |     | Unit – 2: Cellular Organization of the Body                          |
|                 |     | 2.1. Introduction  |
| 2 <sup>nd</sup> | 1hr | 2.2.The cytoplasm, cytoplasmic organelles and cytoplasmic inclusions |
|                 |     | 2.3. The plasma membrane   |
|                 |     | 2.4. Cell nucleus  |
|                 |     | 2.5. Cell cycle  |
|                 |     | 2.6 Cell extensions and connection                                   |
|                 |     | ✓ Cilia, Flagella and cytoskeleton                                   |
|                 |     | ✚ Applied Anatomy  |
| 1hr             |     |  |
| 2hrs            |     | UNIT -3: HUMAN BODY TISSUES  |
|                 |     | Introduction   |
|                 |     | 3.1. Tissue types  |
|                 |     | ◆ The primary tissue classes   |
|                 |     | ◆ Embryonic tissues  |
|                 |     | 3.2. Epithelial tissues  |
| 2 <sup>nd</sup> |     | ◆ Covering epithelium and epithelial membranes                       |
|                 |     | ◆ Glandular epithelium   |
|                 |     | 3.3. Connective tissues  |
|                 |     | ◆ Classification   |

|                 |      |  |
|-----------------|------|--|
|                 |      | <ul style="list-style-type: none"> <li>✚ Embryonic connective tissue</li> <li>✚ Connective tissue proper</li> <li>✚ Connective tissue supportive: bone and cartilage</li> <li>✚ Cartilage <ul style="list-style-type: none"> <li>▶ Hyaline Cartilage</li> <li>▶ Elastic Cartilage</li> <li>▶ Fibrocartilage</li> </ul> </li> <li>✚ Bone <ul style="list-style-type: none"> <li>▶ Compact bone</li> <li>▶ Spongy bone</li> </ul> </li> <li>✚ Connective tissue with special properties: Blood <ul style="list-style-type: none"> <li>♣ Red Blood Cells (erythrocytes)</li> <li>♣ White Blood Cells (leukocytes)</li> <li>♣ Platelets</li> </ul> </li> </ul> |
| 3 <sup>rd</sup> | 3hr  | 3.4. Muscle tissue <ul style="list-style-type: none"> <li>✚ Skeletal muscle</li> <li>✚ Cardiac muscle</li> <li>✚ Smooth muscle</li> </ul> 3.5. Nerve tissues <ul style="list-style-type: none"> <li>♠ Neurons</li> <li>♠ Neuroglia</li> </ul>  |
|                 | 1hr  | Applied anatomy  |
|                 | 2hrs | Unit – 4. GENERAL EMBRYOLOGY   |
|                 |      | 4.1. Introduction  |
|                 |      | 4.2. Gametogenesis <ul style="list-style-type: none"> <li>♠ Formation of male gamete</li> <li>♠ Formation female gamete</li> </ul>   |
|                 |      | 4.3. Fertilization   |
|                 |      | 4.4.1 <sup>st</sup> week of embryonic development  |
| 4 <sup>th</sup> |      | <ul style="list-style-type: none"> <li>◆ Fertilization</li> <li>◆ Cleavage of the zygote</li> <li>◆ Morula</li> <li>◆ Blastocyst formation</li> <li>◆ Implantation</li> </ul>  |
|                 |      | 4.5. 2 <sup>nd</sup> week of embryonic development <ul style="list-style-type: none"> <li>♠ Formation of syncytiotrophoblast</li> <li>♠ Formation of cytotrophoblast</li> </ul>  |

1hr 4.6. 3<sup>rd</sup> week of embryonic development

- Differentiation of germ layers

-  Ectoderm
-  Mesoderm
-  Endoderm

4.7. Placenta

1hr

- ▶ function of placenta
- ▶ structures of placenta

4<sup>th</sup>

4.8 Twins

- Fraternal twins
- Identical twins

## UNIT-5: INTEGUMENTARY SYSTEM

5.1. Structure of the skin ,functions of skin

5.2. Epidermis

5<sup>th</sup>

1hr

- ♠ Four types of cells
  - ◆ Keratinocytes
  - ◆ Melanocytes
  - ◆ Merkel cells
  - ◆ Langerhans cells

Layers (from deep to superficial)

- Stratum basale or germinativum Stratum spinosum\*\*
- Stratum granulosum\*\*
- Stratum lucidum \*\*
- Stratum corneum \*\*  
(\*\*Thick skin only)
- Stratum basale or germinativum\*
- Stratum spinosum\*
- Stratum granulosum\*
- Stratum corneum\*  
(\*Thin skin only)

5.3. Dermis

Two layers:

- ➡ Papillary
- ➡ Reticular

Fiber types:

|                 |     |   |
|-----------------|-----|---|
|                 |     | <ul style="list-style-type: none"> <li>♠ collagen</li> <li>♠ elastic</li> <li>♠ Reticular</li> </ul>  |
|                 |     | ➤ Hypodermis(superficial fascia)  |
|                 |     | 5.4. Appendages of the skin   |
|                 |     | 5.4.1. Subcutaneous glands  |
|                 |     | ➤ Sweat glands  |
|                 |     | Types of sweat glands:  |
|                 |     | <ul style="list-style-type: none"> <li>♠ Eccrine or merocrine</li> <li>♠ Apocrine</li> </ul>  |
| 5 <sup>th</sup> | 1hr | ➤ Sebaceous glands  |
|                 |     | ➤ Ceraminous glands*  |
|                 |     | ➤ Mammary glands*   |
|                 |     | *Modified apocrine glands   |
|                 | 1hr | 5.4.2. Hair   |
|                 |     | <ul style="list-style-type: none"> <li>• Parts: <ul style="list-style-type: none"> <li>♣ Root imbedded in skin</li> <li>♣ Shaft projecting above skin surface</li> </ul> </li> <li>• Three concentric layers: <ul style="list-style-type: none"> <li>◆ Medulla (core)</li> <li>◆ Cortex (surrounds medulla)</li> <li>◆ Cuticl(single layers, overlapping)</li> </ul> </li> <li>• Types of hair: <ul style="list-style-type: none"> <li>• Vellus: fine, short hairs</li> <li>• Intermediate hairs</li> <li>• Terminal: longer, courser hair</li> </ul> </li> </ul> |
|                 | 1hr |   |
|                 |     | 5.4.3. Nails  |
|                 | 1hr | 5.5. Skin color   |
|                 |     | Three skin pigments:  |
|                 |     | <ul style="list-style-type: none"> <li>➤ Melanin</li> <li>➤ Carotene</li> <li>➤ Hemoglobin</li> </ul>   |

## UNIT-6: THE SKELETAL SYSTEM

### 2hrs 6.1. Surface making and their functions

## 6.2. Type of bones and their histology

6<sup>th</sup>

### The Structure of a Typical Bone:

#### ◆ Compact bone

The Histological Features of compact bone:

- ♠ Osteon (Haversian System)
- ♠ Central (Haversian) canal
- ♠ Perforating (Volkmann's) canal

#### ◆ Spongy bone

The Histological Features of Spongy Bone:

- ◆ Lamellae
- ◆ *Trabeculae*

## 6.3 Types of Bone Cells

- Osteoblasts
- Osteocytes
- Osteoclasts

### Classification of Bones:

- Long bones
- Short bones
- Flat bones
- Irregular bones
- Sesamoid bones
- Accessory bones

## 6.4. Division, Location, and Functional anatomy of the bone of the human body

### 6.4.1. Axial skeleton

6<sup>th</sup>

#### ◆ The Skull

- ♠ 8 cranial bones
- ♠ 14 facial bones

#### ◆ The hyoid bone(1)

#### ◆ The Auditory ossicles(3pairs)

- Malleus
- incus
- stapes

#### ◆ Vertebral column- vertebrae

- ▶ 7cervical vertebrae
- ▶ 12 thoracic
- ▶ 5 lumbar
- ▶ 1 sacrum (5 fused )
- ▶ 1 coccyx (4 fused

1hr

6<sup>th</sup>

#### ◆ Thoracic cages

- Sternum



- Ribs
- Thoracic vertebrae
- costal cartilages

#### 6.4.2. Appendicular skeleton

7<sup>th</sup> 1hr

- ➡ Bones of Pectoral girdle
  - ▶ Clavicle (collarbone)
  - ▶ Scapula (shoulder blade)
- ➡ The bones of upper limbs
  - humerus
  - ulna
  - radius
  - Carpal
  - metacarpal
  - phalanges
- ➡ Bones of the pelvic girdle
 

Formed by:

  - ♠ hipbones(Ilium, Ischium and Pubis)
  - ♠ sacrum of the
  - ♠ coccyx
  - Difference b/n male & female pelvis
  - Types of pelvis
    - True pelvis(lesser)
    - False pelvis(greater)
- ➡ The bones of lower limbs
  - ♣ curural (Leg) bones-tibia & fibula
  - ♣ The foot (Pes)
  - ♣ Tarsus – ankle
  - ♣ Metatarsals – sole
  - ♣ Phalanges – toes
- ➡ Bone Fractures
  - ✚ Blood and nerve supply to bones

#### 6.5. Joints /Articulations

1. Structurally are of three types (i.e., based on presence or absence of joint cavity).

7<sup>th</sup> 2hrs

- ◆ Fibrous- Immovable
- ◆ Cartilaginous- slightly movable
- ◆ Synovial- freely movable
  - ♣ Hinge
  - ♣ Ball & socket
  - ♣ Gliding

|                 |     |   |
|-----------------|-----|---|
|                 |     | ♣ Saddle  |
|                 |     | 2. Functionally are three types of joints (i.e. based on the degree of movement)                          |
| 7 <sup>th</sup> | 1hr | ♣ Synarthroses –immovable joints<br>♣ Amphiarthroses – slightly movable<br>♣ Diarthroses – freely movable |

## UNIT-7: THE MUSCULAR SYSTEM

### 7.1. The Skeletal muscle tissue

### 7.2. The Connective tissue components

- ◆ endomysium
- ◆ perimysium
- ◆ epimysium

|                 |     |  |
|-----------------|-----|--|
| 8 <sup>th</sup> | 1hr | 7.3. Criteria for naming the skeletal system   |
|                 |     | ○ Named on the basis of: <ul style="list-style-type: none"> <li>♣ shape</li> <li>♣ location,</li> <li>♣ attachment</li> <li>♣ orientation of fibers</li> <li>♣ relative position, or function</li> </ul> |

|                 |             |  |
|-----------------|-------------|--|
| 8 <sup>th</sup> | 1hr<br>2hrs | 7.4. The principal skeletal muscles in the body  |
|                 |             | <ul style="list-style-type: none"> <li>• Name</li> <li>• Origin and Insertion</li> <li>• Nerve Supply</li> <li>• Blood supply</li> <li>• Function ( action)             <ul style="list-style-type: none"> <li>♠ Maintainance of body posture</li> <li>♠ Movement</li> </ul> </li> </ul> |

|                 |  |                              |
|-----------------|--|------------------------------|
| 9 <sup>th</sup> |  | UNIT – 8: THE NERVOUS SYSTEM |
|-----------------|--|------------------------------|

### 8.1. Protection & coverings

#### 8.1.1. The meninges

|      |  |
|------|--|
| 2hrs | <ul style="list-style-type: none"> <li>• Dura mater</li> <li>• Arachnoid membrane</li> </ul> |
|------|--|

9<sup>th</sup>

- Pia mater
- Sub arachnoid space

#### 8.2.2. The cerebrospinal fluid

##### 8.2.1. The brain ventricles

- The lateral ventricles
- The 3<sup>rd</sup> ventricle
- The 4<sup>th</sup> ventricle

10<sup>th</sup>

3hrs

#### 8.2.2. The formation, circulation and absorption of CSF

### 8.2. Division, organization and functional anatomy of nervous system

#### 8.2.1. The Central Nervous System (CNS)

- The Brain
  - Principal parts
  - External structure
  - Internal structure
  - Function
  - Cranial nerves
- The spinal cord
  - External structure
  - Internal structure
  - Function
  - Spinal nerves

#### 8.2.2. The Peripheral Nervous System (PNS)

- Functional classification of nerves
- Somatic nervous system
- Autonomic nervous system
  - Sympathetic division
  - Parasympathetic division

### 8.3. Sensory Organs

- Special senses

### 8.4. General senses

1hr

## UNIT-9: THE ENDOCRINE SYSTEM

### 9.1. Types and locations of the Endocrine glands in the body

- ◆ The pituitary gland

11<sup>th</sup> 2hrs

- ◆ The thyroid gland
- ◆ The Parathyroid gland
- ◆ The Adrenal glands
- ◆ The Gonads
- ◆ Pancreas
- ◆ Thymus and Pineal glands
- ♠ Blood and nerve supply to Endocrine glands

2hrs

## UNIT-10: THE CARDIOVASCULAR SYSTEM

### 10.1. General consideration

### 10.2. The Heart

- Location and coverings
- The structure of its wall
- Heart chambers
  - Right atrium
  - Left atrium
  - Right ventricle
  - Left ventricle
- Valves of the heart
- Conducting system of the heart
- Great vessels connected to the heart
- Blood and nerve supply to the heart

12<sup>th</sup> 2hrs

### 10.3. The blood vessels

- Types
- General structure of blood vessels
- Distribution of blood vessels in the body
  - Arterial distribution
  - Venous drainage

### 10.4. Circulatory routes

- Systemic circulation
- Pulmonary circulation
- Hepatic circulation
- Cerebral circulation

2hrs

### 10.5. The Lymphatic System

- The Lymph vessel
- The Lymph nodes
- The Lymph Circulation
- The Lymph organs

|                  |      |  |
|------------------|------|--|
| 13 <sup>th</sup> | 3hrs | <p>UNIT-11: THE RESPIRATORY SYSTEM</p> <p>11.1. The pleurae</p> <p>11.2. The Lungs</p> <p>11.3. Function and structure</p> <p>11.4. The Respiratory pathways</p> <p>Nose, Larynx, Trachea, Bronchi and Alveoli</p>   |
|                  | 1hr  | <p>UNIT-12: THE DIGESTIVE SYSTEM</p> <p>12.1. The Peritoneum</p> <p>12.2. General organizations</p>  |
| 14 <sup>th</sup> | 2hrs | <p>12.3. Structure and functional anatomy of the digestive system</p> <ul style="list-style-type: none"> <li>• The Oral cavity <ul style="list-style-type: none"> <li>- Tongue</li> <li>- Salivary glands</li> <li>- Teeth</li> </ul> </li> </ul>                                  |
|                  | 2hrs | <ul style="list-style-type: none"> <li>• The pharynx</li> <li>• The esophagus</li> <li>• The stomach</li> <li>• The intestines</li> <li>• The accessory organs <ul style="list-style-type: none"> <li>- Liver</li> <li>- Gall bladder</li> <li>- Pancreases</li> </ul> </li> </ul> |
| 15 <sup>th</sup> | 2hrs | <p>1.</p> <p>UNIT-13: THE URINARY SYSTEM</p> <p>13.1. The kidneys</p> <ul style="list-style-type: none"> <li>- External structure</li> <li>- Internal structure</li> </ul> <p>13.2. The Ureter</p> <p>13.3. The Urinary bladder</p>  |

#### 13.4. The Urethra

|                  |       |                                      |
|------------------|-------|--------------------------------------|
|                  | 2hrs  | UNIT-14: REPRODUCTIVE SYSTEM         |
| 15 <sup>th</sup> |       | 14.1. The male reproductive system   |
|                  |       | 14.1.1. The spermatic cord           |
|                  |       | 14.1.2. The testes                   |
|                  |       | 14.1.3. The Epididymis               |
|                  |       | 14.1.4. The duct system              |
| 16 <sup>th</sup> | 2hrs  | 14.2. The female reproductive system |
|                  |       | 14.2.1. The ovaries                  |
|                  |       | 14.2.2. The fallopian tubes          |
|                  |       | 14.2.3. The uterus                   |
|                  |       | 14.2.4. Endocrine relation           |
|                  | 2 hrs | 14.3.5. The vagina and vulva         |
|                  |       | 14.3.6. The Breast (mammary glands)  |

**Course Title: Human Physiology I & II**

Course Code: Phyl1032 & Phyl1033, respectively

Course EtCTS: 10

Total hour

- Lecture: 96 hours
- Tutorial :32 hours
- 30 hours for presentations
- 15 hours for assignment
- 16 hours assessment (continuous and final), and
- 78 hours independent study (alone or in groups)

Contact hours/ week:  $267 - (32+30+15+16+78) = 96$  hours/32 weeks = 3 hours/week

Pre-requisite if any: Human Physiology I is the Pre-requisite of Human Physiology II

Course description:

This module will give an overview of a range of physiological systems, including the homeostasis, the cell and cell membrane transport, composition of the body Fluid, physiology of blood, physiology of the nerve, physiology of the muscle, autonomic NS, cardiovascular physiology, respiratory physiology, renal physiology, gastro intestinal system, energy metabolism, endocrine system, male and female reproductive system, central nervous system and the special senses.

Course objectives:

At the end of the module the student should be able to:

- Explain the composition of and levels of organization of human body.
- Describe the basic physiological principle of the “internal environment” of the body.
- Explain basic principles of homeostasis and homeostatic regulatory mechanisms.
- Describe functional importance of different organ systems of human body and their integrated role in the maintenance of homeostasis.

- Appreciate the various physiological regulatory mechanisms of the body in the maintenance of homeostasis.
- Describe the various structures of the GIT, Secretory functions of GIT, Digestive and Absorptive functions and Pathophysiology of the GIT.
- Explain about Energy and Metabolism, Body Temperature Regulation, Feeding regulation and its abnormalities.
- Describe in detail the various endocrine glands of the body and various hormones secreted, the pituitary gland function and malfunction, the thyroid gland function and malfunction, the adrenal gland hormonal abnormalities on the body functions, Calcium homeostasis and Glucose homeostasis.
- Describe the various structures of the male and female reproductive system, Pregnancy and contraception, Parturition and lactation.
- Explain the nervous mechanisms, which govern the regulation and homeostasis of the principal physiological systems.
- Describe in detail the general organization of the NS, Sensory and Motor functions of the NS, Higher motor centers - Functions and lesions.
- Describe the various special senses of the human body

Schedule of contact time, contents/topics & reading/reference materials for each topic

| Week            | Contact<br>hrs | Topic/sub-topic/chapter  | Reading<br>Materials                                  |
|-----------------|----------------|--|---|
| 1 <sup>st</sup> | 3              | <u>General Introduction and Cell Physiology</u> (7Hrs) <ul style="list-style-type: none"> <li>- Composition of human body</li> <li>- Cell membrane, functional structure</li> <li>- Homeostasis</li> </ul> | Guyton (page 3-9)<br>Ganong (p 1-28)<br>Ganong (p 48) |
| 2 <sup>nd</sup> | 3              | <ul style="list-style-type: none"> <li>- Cell organelles</li> <li>- Intracellular connections and Communications</li> </ul>  | Guyton(p 9-17)<br>Ganong(p36-48)                      |



|                 |   |   |   |
|-----------------|---|---|---|
| 3 <sup>rd</sup> | 3 | <ul style="list-style-type: none"> <li>- Transport across cell membrane</li> <li>- Body fluid and electrolytes</li> </ul>   | Guyton(p 45-55)   |
|                 |   | <u>Physiology of Nerve (4 Hrs)</u> <ul style="list-style-type: none"> <li>- Functional structure of neurons</li> <li>- Classification of neurons and neuroglia cells</li> <li>- Membrane potential (resting membrane potential)</li> </ul>  | Ganong(28-36)<br>Guyton(p 57-70)<br>Ganong(p 60-63)     |
| 4 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Action potential (nerve impulse)</li> <li>- Propagation of nerve impulse</li> <li>- Synapses</li> <li>- Synaptic transmission at neuronal synapses</li> </ul>  | Guyton(p 57-70)<br>Ganong(p 51-58)<br>Guyton(p 559-570) |
|                 |   | <u>Physiology of muscles (4 Hrs)</u> <ul style="list-style-type: none"> <li>- Classification of muscles</li> <li>- Muscle structure</li> <li>- Mechanism of muscle contraction</li> <li>- Neuromuscular junction</li> </ul>   | Guyton(p 72-83)<br>Ganong(p 85-119)                     |
| 5 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Excitation-Contraction coupling mechanism</li> <li>- Tetanus &amp; clonus</li> <li>- Myasthenia gravis</li> <li>- Rigor mortis</li> <li>- General aspects of cardiac &amp; smooth muscles</li> </ul>   | Guyton(p 85-99)<br>Ganong(78-84)                        |
|                 |   | <u>The autonomic nervous system (4 Hrs)</u> <ul style="list-style-type: none"> <li>- General organization of the NS</li> <li>- Basic difference between Somatic NS and ANS</li> <li>- Autonomic ganglia, Autonomic reflex</li> <li>- Divisions of ANA: Basic features of Sympathetic NS</li> <li>- Effect of ANA in various organs of the body</li> </ul> | Guyton(p 748-757)<br>Ganong(223-226)<br>Guyton(p 757)   |
| 7 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Autonomic transmitters and receptors, their mechanism of action</li> <li>- Pharmacology of the ANS</li> </ul>  | Guyton (p 759)<br>Ganong(p 223-226)                     |

|                  |   |   |                    |
|------------------|---|---|--------------------|
|                  |   | <u>Physiology of Blood(6 Hrs)</u>                         | Guyton (p 419-428) |
|                  |   | - General Introduction of blood                           | Ganong(p 515-516)  |
|                  |   | - Plasma and plasma proteins                              |                    |
| 8 <sup>th</sup>  | 3 | - RBCs; anemia's and polycythemia                         | Guyton(p 429-449)  |
|                  |   | - WBCs & Immunology                                       | Ganong(p 516- 540) |
| 9 <sup>th</sup>  |   | - Homeostasis, coagulation and disorders                  | Guyton(p 451-467)  |
|                  |   | - Blood groups and blood transfusion                      | Ganong(p 540-546)  |
|                  |   | <u>Physiology of Cardiovascular System (9 Hrs)</u>        |                    |
|                  |   | - General Introduction; functional structure of the heart | Guyton (p 103-110) |
|                  |   | - Electrophysiology of the heart muscle                   | Ganong (p 547-561) |
| 10 <sup>th</sup> | 3 | - The cardiac cycle                                       | Guyton(p 116-121)  |
|                  |   | - The E.C.G   | Guyton(p 123-129)  |
|                  |   | - The heart sounds  |                    |
|                  |   | - Ischemic heart disease and heart failure                | Ganong(p 565-570)  |
|                  |   | - The heart rate and its regulation                       | Ganong(p 597-602)  |
| 11 <sup>th</sup> | 3 | - The cardiac output in normal and in failing heart       | Guyton(p232-244)   |
|                  |   | - The arterial blood pressure and its regulation          |                    |
|                  |   | - Tissue fluid formation and drainage, Edema              |                    |
|                  |   | - The coronary circulation                                | Guyton(p 161-179)  |
| 12 <sup>th</sup> | 3 | - Hypertension: causes, types, complications, Rx          | Ganong(620-643)    |
|                  |   | - Hypotension (Shock): stages and types                   |                    |
|                  |   | <u>Physiology of the Respiratory System (6 Hrs)</u>       | Guyton(p 278-287)  |
|                  |   | - Introduction to RS                                      | Guyton(p 471-476)  |
|                  |   | - Mechanism of breathing                                  | Ganong(p 647-666)  |
|                  |   | - Diffusion and gas transport (O2 and CO2)                |                    |
| 13 <sup>th</sup> | 3 | - Regulation of breathing                                 | Guyton(p514-522)   |

|                  |   |   |                   |
|------------------|---|---|-------------------|
|                  |   | - Hypoxia, cyanosis   | Ganong(p 671-678) |
| 14 <sup>th</sup> | 3 | - Pathophysiology of respiratory system                     | Guyton(p524-532)  |
|                  |   | <u>Renal Physiology</u> (8 Hrs)                             |                   |
|                  |   |   | Ganong(p 683-695) |
|                  |   | - Function of the kidneys                                   | Guyton(p 291-325) |
|                  |   | - Structural function of kidneys, nephrons                  |                   |
|                  |   | - Urine formation, GFR, tubular load, Tm & Plasma clearance | Ganong(p 699-70)  |
| 15 <sup>th</sup> | 3 | - Concentration and dilution of urine                       | Guyton(p 402-414) |
|                  |   | - Micturation and its abnormalities in some diseases        | Ganong(p 723-726) |
|                  |   | - Pathophysiology of the renal system                       |                   |
| 16 <sup>th</sup> | 3 | - Acid-base balance   | Guyton(p 383-400) |
|                  |   | - Chemical and physiological regulation                     | Ganong(p 724-726) |
|                  |   | - Acid-base imbalance                                       |                   |

Delivery mode/methodology:

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group and individual presentation, assignment

Assessment mechanisms:

Continuous assessment & summative assessment

- Quiz
- Assignments
- Final Exam

Schedule of contact time, contents/topics & reading/reference materials for each topic

## PHYSIOLOGY II

| Week            | Contact hrs | Topic/sub-topic/chapter   | Reading materials |
|-----------------|-------------|---|-------------------|
| 1 <sup>st</sup> | 3           | <u>Physiology of Digestive System</u> (8 Hrs)   | Guyton(p 791-799) |
|                 |             | <ul style="list-style-type: none"> <li>- General overview of the GIT</li> <li>- Functional Structures of the GIT</li> <li>- Secretary function of GIT</li> <li>- Salivary Secretion</li> <li>- Gastric secretion</li> </ul> | Ganong(p 467-477) |
| 2 <sup>nd</sup> | 3           | <ul style="list-style-type: none"> <li>- Pancreatic secretion</li> <li>- Intestinal secretion</li> <li>- Bile secretion, jaundice</li> </ul>  | Guyton(p 799-800) |
|                 |             |   | Ganong(p 479-508) |
|                 |             |   | Guyton(p 806)     |
| 3 <sup>rd</sup> | 3           | <ul style="list-style-type: none"> <li>- Digestive &amp; absorptive function of GIT</li> <li>- Pathophysiology of GIT</li> </ul>  | Guyton(p 800-817) |
|                 |             | <u>Energy and Metabolism</u> (4 Hrs)  | Ganong(p 479-508) |
|                 |             | <ul style="list-style-type: none"> <li>- Introduction to Energy and Metabolism</li> <li>- The metabolic rate</li> </ul>   | Guyton(p 819-824) |
|                 |             |   | Guyton(p 830-839) |
|                 |             |   | Ganong(p 279-285) |
| 4 <sup>th</sup> | 3           | <ul style="list-style-type: none"> <li>- Energy balance</li> <li>- Feeding and its regulation</li> <li>- Body temperature regulation</li> <li>- FEVER</li> <li>- Obesity and the balanced diet</li> </ul>                   | Guyton(p 865-878) |
|                 |             |   | Ganong(p 279-285) |
| 5 <sup>th</sup> | 3           | <u>Physiology of Endocrine Glands</u> (12 Hrs)  | Guyton(p 905-916) |
|                 |             | <ul style="list-style-type: none"> <li>- Introduction to Endocrine physiology</li> <li>- Mechanism of action of hormones</li> <li>- Hypothalamus-pituitary relationship</li> </ul>  | Ganong(p 918-921) |
| 6 <sup>th</sup> | 3           | <ul style="list-style-type: none"> <li>- The pituitary gland function and malfunction</li> <li>- The thyroid gland function and malfunction</li> </ul>  | Guyton(p 922-942) |
|                 |             |   | Ganong(p 317-328) |
|                 |             |   | Ganong(p 396-409) |

|                  |   |   |  |
|------------------|---|---|--|
| 7 <sup>th</sup>  | 3 | <ul style="list-style-type: none"> <li>- Adrenal medulla : catecholamine function and malfunction</li> <li>- Adrenal cortex: function and malfunction</li> </ul>  | Guyton(p 944-959)<br>Ganong(p 356-380)   |
| 8 <sup>th</sup>  | 3 | Calcium homeostasis <ul style="list-style-type: none"> <li>- Bone formation and growth</li> <li>- Vitamin D3: synthesis, function and regulation</li> <li>- Parathyroid gland function and dysfunction</li> </ul> Glucose homeostasis <ul style="list-style-type: none"> <li>- Pancreas: endocrine and exocrine function of pancreas</li> <li>- Insulin: synthesis, function, mechanism of action</li> <li>- Glucagon, function, mechanism of action</li> </ul> | Guyton(p 978-992)<br>Ganong(p 382-395)<br>Guyton(p 961-976)<br>Ganong(p 333-353) |
| 9 <sup>th</sup>  |   | <u>Reproductive System(8 Hrs)</u> <ul style="list-style-type: none"> <li>- Introduction to Male Reproductive system</li> <li>- Reproductive and hormonal function of the male testis</li> <li>- Spermatogenesis</li> </ul>  | Guyton(p 996-1001)<br>Ganong(p 441-451)  |
| 10 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Function of seminal vesicles</li> <li>- Function of the prostate gland</li> <li>- The male sexual act</li> <li>- Androgens</li> <li>- Abnormalities of male sex</li> <li>- Reproductive function of female</li> </ul>  | Guyton(p 996-1011)<br>Ganong(p 441-433)  |
| 11 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- The menstrual cycle</li> <li>- Pregnancy and contraception</li> <li>- Parturition and lactation</li> </ul> <u>Physiology of CNS(12 Hrs)</u> <ul style="list-style-type: none"> <li>- General overview and General organization of the NS</li> <li>- General tissue; neurons and neuralgia</li> <li>- Generation and transmission of nerve impulse</li> </ul>   | Guyton(p 1011-1034)<br>Ganong(p 433-451)<br>Guyton(p 555-559)<br>Ganong(p 129)   |
| 12 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Sensory function of the NS</li> <li>- Sensory receptors, classification</li> <li>- Somatic sensation and their pathways</li> </ul>   | Guyton(p 559-583)<br>Ganong(p 138-148)   |
| 13 <sup>th</sup> | 3 | <ul style="list-style-type: none"> <li>- Motor function of the NS</li> <li>- Reflexes; reflex arc, examples</li> <li>- Higher motor centers</li> </ul>  | Guyton(p 673-684)<br>Ganong(p 129-137)   |

|                  |   |  |                   |
|------------------|---|--|-------------------|
| 14 <sup>th</sup> | 3 | - Cerebral cortex                                  | Guyton(p 685-697) |
|                  |   | - Basal ganglia function and disease               |                   |
|                  |   | - Hypothalamus function and disease                | Guyton(p 698-713) |
|                  |   | - Thalamus function and disease                    |                   |
|                  |   | - Cerebellum function and disease                  | Ganong(p 202-217) |
| 15 <sup>th</sup> | 3 | - The brain stem; reticular formation              |                   |
|                  |   | - Pyramidal and extra pyramidal tracts, lesion     |                   |
|                  |   | - Limbic system                                    | Guyton(p 728-738) |
|                  |   | - Reticular activating system                      |                   |
|                  |   | - Brain electrical activity: EEG and sleep         | Ganong(p 192-196) |
|                  |   | - Cerebral cortex, memory, speech, and aphasia     | Guyton(p 613-649) |
|                  |   | <u>Physiology of the Special senses (4 Hrs)</u>    |                   |
|                  |   |  | Ganong(p 148-168) |
| 16 <sup>th</sup> | 3 | - Introduction to Physiology of the Special senses |                   |
|                  |   | - Visual sensation                                 |                   |
|                  |   | - Auditory sensation                               | Guyton(p 651-668) |
|                  |   | - Olfactory sensation                              |                   |
|                  |   | - Gustatory sensation                              | Ganong(p 171-188) |

#### Delivery mode/methodology:

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group and individual presentation, assignment,

#### Assessment mechanisms:

Continuous assessment & summative assessment

- Quiz
- Assignments
- Final Exam

#### References:

1. Guyton A. C 1995-2006. Textbook of Medical physiology. 9<sup>th</sup> -11<sup>th</sup> editions
2. Ganong WF 1993-2006. Review of Medical physiology, 18<sup>th</sup> -22<sup>nd</sup> editions
3. Tortora G. J 1993. Principles of Anatomy and physiology. 7<sup>th</sup> edition.
4. Salah Abu-Sitta. Handouts containing different chapters (eight separate handouts.)

## **Module 4: Chemistry Module**

**Module name:** Chemistry module

**Module category:** Basic

**Module code:** Chem-M1043

**Module Number:** 04

**Module weight in EtCTS:** 7 EtCTS

**Courses:** Fundamentals of organic Chemistry (Chem1041) (5 EtCTS)

Practical organic Chemistry (Chem1042) (2 EtCTS)

### **Module description**

Organic chemistry is a chemistry based discipline that deals with carbon related compounds. The module builds on the students' knowledge and understanding of functional groups, (structure, nomenclature, stereochemistry), reaction mechanisms, biological molecules and biotransformation. Students will acquire knowledge of some reactions of organic chemistry, particularly carbonyl reactions, substitution, addition and elimination reactions which are examined in terms of reaction type, mechanism and stereochemical implications. They will then apply this knowledge to devise organic synthetic pathways. The student will also examine the synthesis and reactivity of aromatic and heteroaromatic compounds with an emphasis on the named reactions.

**Module objective:** Students will demonstrate knowledge and understanding of the fundamental theories and practices of organic chemistry and apply the concepts and principles to solve problems related to Pharmacy. The course emphasize about classification, naming, identification, reaction, mechanism and synthesis or preparation of organic compounds and organic biological molecules. Differentiate organic chemicals in terms of their usefulness, hazards, and cautions to be taken in the manufacture, storage and use.

### **Module competencies:**

- Discuss the chemical bonding theories and influence of bonding types on properties of compounds
- Determine the stereochemistry of organic molecules
- Explain mechanisms in organic reactions and describe the factors affecting reaction rates
- Explain the physical and chemical behaviors of organic compounds based on their functional groups
- Explain the properties, preparation and reactions of organic compounds
- Describe different classes of Biological molecules and apply the knowledge and principles to Medicinal chemistry

- Predict the existence of the kinds of stereo isomers, represent and designate their structures
- Review of the classes of organic compounds and give systematic name to different organic compounds
- Develop practical laboratory skills in chemical and analytical procedures and realize the importance of chemistry in everyday life

**Mode of delivery:** Block

Total time: 189hrs

Lecture: 54 hrs

Tutorials: 6 hrs

Practical lab: 42 hrs

Independent study hour: 65 hrs

Seminar, Assignments and assessment: 12 hrs

Assessment: 10 hrs

**Mode of Assessment:**

Laboratory Reports

Laboratory Presentation

Laboratory written Exam

Assignments and Seminars

Practical exam

Quizzes

Final-exam

**Learning activities and teaching methods**

Interactive lectures, case studies, computer assisted learning, formative problem-solving exercises, self-directed learning through virtual learning environment and technologies, practical activities and assignments.

**Teachers' and students' role**

**Teacher's role**

Course instructors are expected to:

- Provide lecture and guide students
- Providing assignments to be done and feedback for students
- Prepare lecture note, Assignment topics and title for group discussions
- Select seminar title and advice students in preparation and presentations
- Prepare assessing questions and examine students
- Organize laboratory sessions and demonstrate some laboratory activities
- Prepare laboratory manuals

**Student's role**

Students are expected to:

- Read text books, lecture handouts and reference books



- Be an active participant in class discussion (ask questions and answering questions)
- Prepare paper under the title given for seminars, assignments and present it
- Analyze and evaluate different literatures, reference books and journal articles
- Perform laboratory activities
- Write laboratory reports
- Taking exams

## Chemistry Module syllabi

**Module number**                **04**

**Course Title**                    **Fundamentals of Organic Chemistry**

**Course Code**                    Chem1041

**Course EtCTS**                   5 (135 hrs)

**(Course hour)**

**Pre-requisite**                    None

**Co-requisite**                    None

**Course Description**        This course is intended to provide the students basic understanding of different classes of organic functional groups ( alkanes, , alkenes, and alkynes, alkyl halides , alcohols, ethers, aromatic rings, ketones, aldehydes, carboxylic acids and their derivatives, amines biomolecules (carbohydrates, ,proteins, lipids and nucleic acid) with a special focus on their physical properties (boiling point, melting point, solubility,) and chemical properties(reactivity and reaction mechanism) and basics of stereochemistry and basics of drug activities in relation to stereochemistry and Chemical bonding. In addition it deals with Chemistry of Aromatic Compounds; Carbonyl Reactions; Introduction to biological molecules.

**Course Objectives**        Upon completion of this course the students would be able to: discuss the chemical bonding theories and influence of bonding types on properties of compounds predict the existence of the kinds of stereo isomers, represent and designate their structures determine the stereochemistry of organic molecules describe the factors affecting reaction rates and explain mechanisms in organic reactions give systematic name to different organic compounds review of the classes of organic compounds explain the physical and chemical behaviors of organic compounds based on their functional groups explain the properties, preparation and reactions of aromatic compounds discuss different types of reactions of carbonyl compounds describe different classes of Biological molecules.

**Supporting objectives**

- Familiar with types of bonding and principle of formation and hybridization
- Explain the structures of organic compounds.
- Familiar with the most important classes of organic functional groups and their physical and chemical properties.
- Use the rules of nomenclature to give correct names for organic compounds
- Draw correct structures that correspond to a name, and correctly use and recognize common names.
- Use principles of stereochemistry to locate stereocenters and label stereoisomers,
- Identify chiral compounds, give stereochemical relationships between molecules,
- Use Fischer projections, solve optical activity problems, and identify stereochemical results of a reaction.
- Be able to identify typical chemical reactions on the basis of their structure and properties
- Give starting materials, reagents, and products for reactions of organic compounds.
- Classify various biological molecules such as carbohydrates, lipids, amino acids and proteins, and their important chemical properties.

**Course Content**

1. Structure
  - 1.1. Energy levels and Atomic orbital
  - 1.2. Covalent bonds
  - 1.3. Molecular orbital theory
  - 1.4. Orbital hybridization
2. Nomenclature
  - 2.1. Alkanes
  - 2.2. Alkenes and Alkynes
  - 2.3. Alcohols
  - 2.4. Aldehydes
  - 2.5. Ketones
  - 2.6. Amines
  - 2.7. Ethers
  - 2.8. Aromatics
3. Stereochemistry
  - 3.1. Symmetry and dissymmetry
  - 3.2. The asymmetric carbon
  - 3.3. Optical isomerism

- 3.4. Fischer projections
- 3.5. Multiple asymmetric centers
- 3.6. Configuration
- 4. Substitution reactions
  - 4.1. SN1 and SN2 mechanisms
  - 4.2. Applications of substitution Reactions
    - 4.2.1. Alcohols
    - 4.2.2. Ethers
    - 4.2.3. Carboxylic acids
    - 4.2.4. Alkanes, Alkenes, and Alkynes
    - 4.2.5. Amines
    - 4.2.6. Epoxide Ring opening
    - 4.2.7. Reactions of malonic ester and acetoacetic ester
- 5. Elimination reactions
  - 5.1. Mechanisms
  - 5.2. Evidences for mechanisms of elimination reaction
  - 5.3. E1 versus E2
  - 5.4. Elimination versus substitution
  - 5.5. Applications of elimination reactions
    - 5.5.1. Dehydration of Alcohols
    - 5.5.2. Dehydrohalogenation of alkylhalides
    - 5.5.3. Vicinal Dihalides
    - 5.5.4. Hofmann Elimination
    - 5.5.5. Acetate pyrolysis
    - 5.5.6. Cope reaction
- 6. Addition Reactions
  - 6.1. Mechanism
  - 6.2. Reactivity
  - 6.3. Rules of addition reactions
    - 6.3.1. Markovnikov Rule
    - 6.3.2. Michael Addition
    - 6.3.3. Radical addition
  - 6.4. Applications of Addition Reactions
    - 6.4.1. Addition of halogen
    - 6.4.2. Addition of hydrogen halide
    - 6.4.3. Addition of hypohalous acids
    - 6.4.4. Hydration of alkenes
    - 6.4.5. Hydroboration
    - 6.4.6. Diels-Alder addition

- 6.4.6.1. Kinetic vs Thermodynamic control of the Diels-Alder reaction
    - 6.4.6.2. Stereochemistry of the Diels-Alder reaction
  - 6.4.7. Catalytic hydrogenation
  - 6.4.8. Ozonization
  - 6.4.9. Peracid oxidation
  - 6.4.10. Glycol formation
- 7. Aromatic substitution reactions
  - 7.1. Introduction
  - 7.2. Aromaticity
  - 7.3. Aromatic substitution
  - 7.4. Directing effects
  - 7.5. Application of electrophilic substitutions
    - 7.5.1. Halogenation
    - 7.5.2. Sulfonation
    - 7.5.3. Nitration
    - 7.5.4. Friedel-Crafts Alkylation
    - 7.5.5. Friedel-Crafts Acylation
    - 7.5.6. Diazotization of Amines
    - 7.5.7. Reactions of aromatic side chains
- 8. Carbonyl reactions
  - 8.1. Carbonyl addition
  - 8.2. Addition Elimination
  - 8.3. Enolization Ketonization
  - 8.4. Application of Addition reactions
    - 8.4.1. Hydrate formation
    - 8.4.2. Hemiacetals and Hemiketals
    - 8.4.3. Cyanohydrins
    - 8.4.4. Carbinolamines
    - 8.4.5. addition of Grignard reagents
    - 8.4.6. Addition of hydrogen
    - 8.4.7. Lithiumaluminumhydride and sodiumborohydride
  - 8.5. Application of addition-elimination reactions
    - 8.5.1. Imines and related compounds
    - 8.5.2. Wittig reaction
    - 8.5.3. Acetal and ketal formation in acid media
    - 8.5.4. Acids and their derivatives
    - 8.5.5. Ester hydrolysis and formation in acid media
    - 8.5.6. Acid chlorides
    - 8.5.7. Acid anhydrides

- 8.5.8. Reduction of acid derivatives
- 8.6. Application of enolization-ketonization reactions
  - 8.6.1. Halogenation
  - 8.6.2. Alkylation
  - 8.6.3. aldol condensation
  - 8.6.4. Claisen-Schmidt condensation
  - 8.6.5. Mannich condensation
  - 8.6.6. Perkin condensation
  - 8.6.7. Claisen condensation
- 9. Rearrangement reactions
  - 9.1. Rearrangement to an electro-deficient carbon
  - 9.2. Rearrangement to an electro-deficient oxygen
  - 9.3. Rearrangement to an electro-deficient nitrogen
- 10. Oxidation-reduction reaction
  - 10.1. Introduction
  - 10.2. Oxidation reaction
    - 10.2.1. Alcohols
    - 10.2.2. Aldehydes
  - 10.3. Reduction Reactions
    - 10.3.1. Catalytic hydrogenation
    - 10.3.2. Chemical Reduction
    - 10.3.3. Dissolving metal reductions
    - 10.3.4. Acyloin condensation
- 11. Electrocyclic Reactions
  - 11.1. Molecular Orbital
  - 11.2. Electrocyclic reactions
  - 11.3. Stereospecificity of cyclic reactions
- 12. Biological molecules
  - 12.1. Glucose: An introduction to carbohydrate chemistry
  - 12.2. Disaccharides and polysaccharides
  - 12.3. Amino-acids, peptides, and proteins
    - 12.3.1. The structure and properties of alpha-amino acids
    - 12.3.2. Analysis of alpha-amino acids
    - 12.3.3. Synthesis of alpha-amino acids
  - 12.4. Peptides and proteins
  - 12.5. Peptide synthesis
- 13. Biological transformation
  - 13.1. Glycolysis
  - 13.2. Thiamine

- 13.3. Tricarboxylic acid cycle
- 13.4. Vitamin B6-Transamination
- 13.5. Mechanism of chymotrypsin action storage of metabolic energy
- 13.6. Generation and storage of metabolic energy
- 13.7. Biosynthetic pathways

**Total** **48**

**Mode of Delivery**

Lecture: 48hrs  
 Tutorials: 6hrs  
 Independent study hour: 59hrs  
 Seminar, Assignments and assessment: 12hrs  
 Assessment: 10 hrs

**Mode of Evaluation**

Assignments and Seminars; 15%  
 Quizzes: 35%  
 Final-exam: 50%

**Text Book** Organic Chemistry, A concise approach 2nd ed, Menger, Goldsmith, Mandell.

**Reference Books**

Organic reaction Mechanisms 1993. A.C. Knope and w.E. Watts,  
 University of Ulster Northern Ireland.

Organic reaction Mechanisms, Ronald Brewlow, Columbia University,  
 second edition.

Organic Chemistry. Graham solomons, 6th ed, Univ of South Florida.

A textbook of Organic Chemistry, K.S. Tewair, S.N. Mehrotra, N.K.  
 Vishnoi

|                                       |  |
|---------------------------------------|--|
| <b>Course Title</b>                   | <b>Practical Organic Chemistry</b>   |
| <b>Course Code</b>                    | Chem1042   |
| <b>Course EtCTS<br/>(Course hour)</b> | 2 (54 hrs)   |
| <b>Pre-requisite</b>                  | None   |
| <b>Co-requisite</b>                   | None   |
| <b>Course Description</b>             | The course is designed to give basic understanding and concepts of practical organic chemistry. In this course students will learn to work with organic chemistry by obtaining and identifying them, and transforming them. Furthermore, they will learn many separation and purification techniques such as filtration, recrystallization, distillation, chromatography and extraction. They will be acquainted with methods of identification of unknown simple organic molecules using physical means (such as melting point, boiling points and solubility determination) and simple chemical tests.   |
| <b>Course Objectives</b>              | Upon completion of this course the students would be able to develop skill in organic chemical reaction and procedures in synthesis and extraction that will help in drug chemistry courses  |
| <b>Supporting objectives</b>          | <ul style="list-style-type: none"> <li>• Perform organic chemistry experiments that have relevance in industrial, teaching medical and biological fields</li> <li>• Discuss the techniques used to purify contaminated organic compounds</li> <li>• Gain experience in handling of laboratory chemicals and operating apparatus</li> <li>• Develop an ability to synthesize (prepare) different types of organic compounds</li> <li>• Gain skills in making observations, recording data scientific report writing and experimental data management</li> <li>• Design and interpret their own experiments and data obtained from the experiments</li> <li>• Understand the desirable techniques used to separate organic compounds from a mixtures</li> <li>• Proficient in the most important aspect of laboratory work</li> <li>• Develop a feeling of three-dimensional nature of molecules, and</li> </ul> |

also recognize how shapes and conformations of organic molecules affect their physical and chemical properties

- Suggest methods of improving the experiment by pointing out the drawbacks encountered and sources of errors

### Course Content

|   |  |
|---|--|
| 1. Orientation, general discussion on laboratory safety rules, policies and report writing, and manual distribution | 3hr  |
| 2. Experiment № 1: Recrystallization  | 3hr  |
| 3. Experiment № 2: Simple and Fractional Distillation   | 3hr  |
| 4. Experiment № 3: Distinguishing organic compounds: Functional group analysis                                      | 3hr  |
| 5. Experiment № 4: Molecules in three dimensions (Stereochemistry)  | 3hr  |
| 6. Experiment № 5: Preparation of cyclohexene from cyclohexanol   | 3hr  |
| 7. Experiment № 6: Preparation of Aspirin   | 3hr  |
| 8. Experiment № 7: Fats, oils and soaps: Preparation and properties of soap   | 3hr  |
| 9. Experiment № 8: Introduction to chromatography   | 3hr  |
| 10. Experiment № 9: Steam distillation: extraction of essential oil from medicinal plants                           | 3hr  |
| 11. Experiment № 10: Extraction of caffeine from coffee/tea   |  |
| <b>Total</b>  | <b>33hrs</b>   |
| <b>Mode of Delivery</b>   | <ul style="list-style-type: none"> <li>• Lecture: 6 hrs</li> <li>• Independent study hour: 10 hrs</li> <li>• Practical lab: 33 hrs</li> <li>• Assignments and assessment: 6 hrs</li> </ul> |
| <b>Mode of Evaluation</b>   | <ul style="list-style-type: none"> <li>• Laboratory Reports: 10%</li> <li>• Laboratory Presentation: 10%</li> <li>• Assignments and Seminars: 10%</li> </ul>                               |



- Practical exam: 35%
- Final written exam: 25%

#### **Text Book**

Organic Chemistry, A concise approach 2nd ed, Menger, Goldsmith, Mandell.

#### **Reference Books**

1. Ermias, D. Experiments in Organic Chemistry, 3<sup>rd</sup> edition, Addis Ababa University press, Addis Ababa, Ethiopia, 2009.
2. Bansal, R. K. Laboratory Manual of Organic Chemistry, 4<sup>th</sup> edition, New Age International (P) Limited publishers, Saras Graphics, Noida, India, 2006.
3. Shriner, R. L.; Hermann, C. K. F.; Morrill, T. C.; Curtin, D. Y.; Fuson, R. C. The systematic identification of organic compounds. 7<sup>th</sup> edition, John Wiley and Sons, New York, USA, 1997.
4. Pavia, D. L.; Lampman, G. M.; Kriz, G. S. Introduction Organic laboratory techniques: A microscale Approach, 3<sup>rd</sup> edition, Saunders College Publishing, Philadelphia, USA, 1999.
5. Wendimagegn M. Practical Organic Chemistry II laboratory manual: Addis Ababa University; 1996.
6. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchel, A. R. Vogel's textbook of practical Organic Chemistry; 5<sup>th</sup> edition, Pearson Education Limited, Harlow, England, 1989

## **Module 5: Biomedical Sciences-II**

**Module name:** Biomedical science II

**Module category:** Basic

**Module code:** Biom-M1053

**Module Number: 05**

**Module weight in EtCTS: 17**

**Courses:** Biochemistry I (Bioc1051) (5 EtCTS)

Biochemistry II (Bioc1052) (5 EtCTS)

Microbiology, parasitology and immunology (Mbio1053) (7 EtCTS)

General Pathology (Path 2054) (5 EtCTS)

### **Module description**

The module provides students with basic knowledge and understanding of the normal chemical and metabolic processes of the body and how this is affected by certain disorders; knowledge of the molecular basis of certain types of diseases, and the biochemical basis of drug actions and effects of toxins; help the student to understand and appropriately identify biochemical disorders and recommend specific treatment regimen. This module is also designed to enable the students understand the background to the development of microbiology; classification, nomenclature, microscopic characterization and morphology, reproduction and growth of microorganisms and parasitic agents. It also explains the cultivation techniques and nutritional requirements of microorganisms. The immunology part helps the student learn about the basis of immunity, preparation and characterization of antibodies, the mechanism of antibody-antigen reactions and diagnostic applications of immunological principles. The practical sessions include identification of bacteria, staining techniques, media and culture preparation, sterilization, antibiotic testing, assay and sensitivity test

**Module objective:** This module provides students with basic understanding of; the normal chemical and metabolic processes of the body and how this is affected by certain disorders; identification and characterization of different type of microbial and parasites and also the disease they cause; basics of immunological principle

**Module competency:**

- Apply the concept of Biochemistry to drug therapy
- Apply knowledge of common disease causing organism to drug therapy

**Module mode of delivery:** Blocked for biochemistry courses and parallel for Microbiology and immunology course

**Module mode of Assessment:**

Quizzes  
Mid exam  
Final Exam  
Seminar  
Laboratory  
Assignment

**Module learning teaching methods**

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group & individual presentation, assignment, project work, and laboratory work.

**Course title: Biochemistry I**

**Course code: Bioc. 1051**

**Course EtCTS: 5 (135 hrs)**

- Lecture: 48 hours
- Tutorial: 9 hours
- Home study: 60 hours
- Assignment and presentation: 18 hours

Contact hours/ week:  $135-87=48$  hours/ 16 weeks= 3 hours

Pre-requisite if any: Organic Chemistry

Course description:

This Biochemistry course is designed to prepare B.Sc. graduate anesthesia students who are competent providers of anesthesia services. Students will be able to explain the biochemical aspects of human life & describe the biochemistry of carbohydrates, proteins, lipids and nucleic acids. It contains only the theoretical part that the trainee should pass through to

acquire the basic competence in accomplishing organizational activities relating to its coverage.

Course objectives:

- After completing this course, the student will be able to explain the biochemical aspects of human life; describe the chemistry and metabolism of biomolecules (carbohydrates, lipids, proteins and nucleic acids); explain central metabolism; outline the transmission & expression of genetic information and correlate the biochemical processes with health & disease.

Specific Objectives:

1. Describe the structure and classification of carbohydrates
2. Outline the metabolic pathways for anaerobic glycolysis, pentose shunt, and gluconeogenesis, including substrates, unique enzymes and regulatory mechanisms.
3. Outline the metabolic pathways for synthesis and degradation of glycogen.
4. Differentiate the structure and composition of lipids.
5. Describe the composition and functions of different lipoproteins present in plasma.
6. Outline the sequence of reactions involved in oxidation of fatty acids in the mitochondrion.
7. Explain the rationale for the pathway of ketogenesis and identify the major intermediates and products of this pathway.
8. Describe the synthesis of fatty acids and triglycerides.
9. Outline the sequence of reactions in the tri carboxylic acid cycle and explain the purpose of the cycle.
10. Outline the mitochondrial electron transport system and define membrane potential and explain its role in ATP synthesis and thermogenesis.
11. Describe the structure and classification of amino acids & proteins.
12. Describe the mechanism of oxygen binding to myoglobin and hemoglobin.

Schedule of contact time, contents/topics & reading/reference materials for each topic

| Week | Contact hrs | Topic/sub-topic/chapter  | Reading materials   |
|------|-------------|--|---|
| 1    | 2           | 1.INTRODUCTION TO BIOCHEMISTRY<br>– Introduction:<br>• Definitions<br>• Role of biochemistry<br>– Cellular components<br>– Brief introduction to metabolism& Enzymes   | Lehninger Principles of Biochemistry (Page No. 3-12)  |
| 1-2  |             | 2.WATER & pH<br>– Role of water in biological system<br>– Acid base theories<br>• Definition of pH, pKa and pKb<br>– Buffers&Acid-base balance   | Harper's Biochemistry (Page No. 5-13)   |
| 3-7  | 15          | 3.CARBOHYDRATES<br>– Structure & classification of carbohydrates<br>– Digestion & absorption of carbohydrates<br>– Metabolism of carbohydrates:<br>• Glycolysis<br>• Oxidation of pyruvate<br>• Pentose phosphate path way<br>• Glycogen metabolism<br>• Gluconeogenesis<br>• Metabolism of major non-glucose sugars<br>Regulation of blood glucose  | Lehninger Principles of Biochemistry (page No. 239-255)<br>Harper's Biochemistry Page No. 130-136, 136-163) |
| 8-12 | 15          | 4. LIPIDS<br>– Structure and classification of lipids<br>– Biological membranes<br>– Digestion & absorption of lipids<br>– Metabolism of fatty acids:<br>• Biosynthesis and storage of fatty acids<br>• Oxidation of Fatty Acids<br>• Ketogenesis & Ketolysis<br>– Lipid transport and storage:<br>• Structure and function of Lipoproteins<br>– Cholesterol synthesis, transport, & excretion | Harper's Biochemistry (Page No. 111-122)<br>Pamela C.C. (Page No. 163-205)                                  |

|       |   |   |   |
|-------|---|---|---|
| 13-14 | 6 | <p>5. CENTRAL METABOLISM</p> <ul style="list-style-type: none"> <li>– Tricarboxylic acid (Krebs') cycle</li> <li>– Bioenergetics (thermodynamics): <ul style="list-style-type: none"> <li>• Related to nutrition and obesity</li> <li>• The Electron transport system</li> <li>• Oxidative phosphorylation</li> </ul> </li> </ul>   | <p>Pamela C.C. (Page No. 105-109)</p> <p>Harper' Biochemistry (Page No. 92-102)</p>   |
| 15-16 | 6 | <p>6. AMINO ACIDS AND PROTEINS</p> <ul style="list-style-type: none"> <li>– Structure and classification of amino acids <ul style="list-style-type: none"> <li>• Physico-chemical properties of amino acids</li> </ul> </li> <li>– Structure &amp; functions of proteins <ul style="list-style-type: none"> <li>• Mechanism of oxygen binding to myoglobin and hemoglobin.</li> </ul> </li> </ul> | <p>Pamela C.C. (Page No. 229-267)</p> <p>Harper's Biochemistry (Page No. 249-264)</p> |

Delivery mode/methodology:

- Active learning methods (brain storming, discussion, etc), Lecture, group and individual presentation, assignment.

Assessment mechanisms:

Continuous assessment & summative assessment

- Class attendance (%)
- Quiz (%)
- Assignments (%)
- Final Exam (50

Learning Materials

- Handouts
- Audiovisual aids: Computer & LCD
- Textbook:
  - ▶ Pamela C.C, and Richard A.H., Lippincott's Illustrated Reviews: Biochemistry, 3<sup>rd</sup> edition, J.B.Lippincott Company Philadelphia, 2004.

References:

1. Stryer L.et al.Biochemistry,5<sup>th</sup> edition, W.H. Freeman and Company &Sumanas, Inc., 2004.

2. Murray R.K et al. Harper's Illustrated Biochemistry 27<sup>th</sup> edition, The McGraw-Hill Companies, Inc., 2006.
3. Lehninger A.L. Principles of Biochemistry, CBS publishers and distributors, 2006.
4. Lieberman M. et al. Marks' Essential Medical Biochemistry, 2<sup>nd</sup> Edition, Lippincott Williams & Wilkins, 2007.
5. Zubay P. et al. Principles of Biochemistry, W.M.C. Brown Publishers USA, 1995.
6. Smith E.L et. al., Principles of Biochemistry, McGraw-Hill-International, 1993 or recent edition.

**Course title: Biochemistry II**

**Course code: Bioc. 1052**

**Course EtCTS: 5 (135 hrs)**

- Lecture: 48 hours
- Tutorial: 9 hours
- Home study: 60 hours
- Assignment and presentation: 18 hours

Contact hours/ week:  $135 - 87 = 48$  hours/ 16 weeks = 3 hours

Pre-requisite if any: Organic Chemistry

Course description:

- This Biochemistry course is designed to prepare B.Sc. graduate anesthesia students who are competent providers of anesthesia services. Students will be able to explain the biochemical aspects of human life & describe the biochemistry of carbohydrates, proteins, lipids and nucleic acids. It contains only the theoretical part that the trainee should pass through to acquire the basic competence in accomplishing organizational activities relating to its coverage.

Course objectives:

- After completing this course, the student will be able to explain the biochemical aspects of human life; describe the chemistry and metabolism of biomolecules (carbohydrates, lipids, proteins and nucleic acids); explain central metabolism; outline the transmission & expression of genetic information and correlate the biochemical processes with health & disease.

### Specific Objectives:

1. Describe the structure and classification of amino acids & proteins.
2. Describe the mechanism of oxygen binding to myoglobin and hemoglobin.
3. Describe the mechanisms used by humans for removal of the nitrogen from amino acids prior to the metabolism of their carbon skeletons.
4. Discuss the structure and composition of enzymes, including cofactors, and conditions that affect enzymatic reactions.
5. Compare and contrast the structure and biosynthesis of purines and pyrimidines, highlighting the differences between de novo and salvage pathways.
6. Describe the compositions and structures of DNA and RNA.
7. Explain how replication of DNA is achieved with high fidelity in a bidirectional manner and in a semi-conservative fashion.
8. Describe the major steps in transcription of an RNA molecule.
9. Describe how the different RNAs involved in protein synthesis interact to produce a polypeptide.

### Delivery mode/methodology: Block

- Active learning methods (brain storming, discussion, etc), Lecture, group and individual presentation, assignment

### Assessment mechanisms:

#### Continuous assessment & summative assessment

- Class attendance (%)
- Quiz (%)
- Assignments (%)
- Final Exam (50%)

### Learning Materials

- Handouts
- Audiovisual aids: Computer & LCD
- Textbook:
  - ▶ Pamela C.C, and Richard A.H., Lippincott's Illustrated Reviews: Biochemistry, 3<sup>rd</sup> edition, J.B.Lippincott Company Philadelphia, 2004.



|      |    |   |  |
|------|----|---|--|
| 1-7  | 20 | 1. AMINO ACIDS AND PROTEINS <ul style="list-style-type: none"> <li>• Digestion &amp; absorption of proteins</li> <li>• Metabolism of proteins &amp; amino acids: <ul style="list-style-type: none"> <li>○ Biosynthesis of nonessential amino acids</li> <li>○ Catabolism of Proteins &amp; of Amino Acid Nitrogen- Urea cycle</li> <li>○ Catabolism of the carbon skeletons of amino acids</li> <li>○ Conversion of amino acids to specialized products</li> <li>○ Metabolism of Haem:</li> <li>○ Porphyrins &amp; Bile Pigments</li> </ul> </li> </ul> | Pamela C.C.<br>(Page No. 229-267)<br>Harper's Biochemistry<br>(Page No. 249-264)<br><br>Harper's Biochemistry<br>(Page No-270-286) |
| 7-9  | 6  | 8. VITAMINS <ul style="list-style-type: none"> <li>– Classification of vitamins</li> <li>– Structure and function of: <ul style="list-style-type: none"> <li>• Water &amp; Fat soluble vitamins</li> </ul> </li> </ul>  | Harper's Biochemistry<br>(Page No. 49-72)<br>Pamela C.C.<br>(Page No. 47-58)   |
| 9-16 | 18 | 9. MOLECULAR BIOLOGY <ul style="list-style-type: none"> <li>– Nucleotide structure</li> <li>– Biosynthesis &amp; Degradation of nucleotides</li> <li>– DNA structure and Replication</li> <li>– RNA structures and Transcription</li> <li>– Protein Synthesis: <ul style="list-style-type: none"> <li>• The Genetic Code</li> <li>• Translation</li> </ul> </li> <li>– Mutation</li> <li>– Regulation of gene expression in <ul style="list-style-type: none"> <li>• Prokaryotes</li> <li>• Eukaryotes</li> </ul> </li> </ul>                           | Pamela C.C.<br>(Page No. 319-330)<br>Harper's Biochemistry<br>(Page No. 481-497)   |

■ References:

1. Stryer L. et al. Biochemistry, 5<sup>th</sup> edition, W.H. Freeman and Company & Sumanas, Inc., 2004.
2. Murray R.K et al. Harper's Illustrated Biochemistry 27<sup>th</sup> edition, The McGraw-Hill Companies, Inc., 2006.
3. Lehninger A.L. Principles of Biochemistry, CBS publishers and distributors, 2006.
4. Lieberman M. et al. Marks' Essential Medical Biochemistry, 2<sup>nd</sup> Edition, Lippincott Williams & Wilkins, 2007.

|  |   |          |                 |                               |         |
|--|---|----------|-----------------|-------------------------------|---------|
| <b>Course title/</b>   | <b>Microbiology, Parasitology &amp; immunology</b>  |          |                 |                               |         |
| <b>course code</b>   | Mbio1053  |          |                 |                               |         |
| <b>Course ECTS</b>   | 7 ECTS  |          |                 |                               |         |
| <b>Course hours</b>  | Lecture   | Tutorial | Lab<br>practice | Home study<br>individual work | Total   |
|  | 48 hrs  | 10 hrs   | 32 hrs          | 100 hrs                       | 189 hrs |
| <b>Course objective<br/>and competences to<br/>be acquired</b> | <ul style="list-style-type: none"> <li>○ This course helps the students:</li> <li>○ To understand brief history of Medical Microbiology and important events, discoveries and inventions significantly contributed to its development as a science.</li> <li>○ To appreciate the relationship between microbes, the immune system, and disease outcomes.</li> <li>○ To understand how the immune system functions in a specific and non-specific way, to defend the host against infections by bacteria, fungi and viruses.</li> <li>○ To recognize the structural components of microbes (bacteria, fungi, parasites and viruses) and how these impact the pathogenesis of disease.</li> <li>○ To explain the methods of microorganisms control ( chemotherapy &amp; vaccines, disinfection and sterilization )</li> <li>○ To know the common microorganisms associated with specific clinical diseases and what factors are involved in pathogenesis.</li> <li>○ To appreciate the role of immune system in allergic diseases.</li> <li>○ To appreciate the role of the clinical laboratory in diagnosis and management of infectious diseases.</li> <li>○ To develop the ability to correlate the clinical picture with laboratory information to establish a diagnosis and select for appropriate treatment options.</li> <li>○ To understand mechanism of action of anti-microbial agents</li> <li>○ To appreciate mechanisms how microbes resist anti-microbial agents</li> </ul> |          |                 |                               |         |

- To enhance critical thinking and problem-solving skills and the ability to effectively communicate with and work with peers
- Discuss the concepts of parasitism, the relationships between parasites and host, between parasites and environment
- Recognize the general epidemiological aspects of parasites that affect human
- Illustrate the life cycle of specific parasites and identify the important parasitic agent affecting human health
- Describe some important arthropods responsible for the transmission of disease causing parasites
- Describe commonly used methods for microscopic examination of parasites
- Describe the transmission and pathogenesis of helminthes infections
- Describe the basic concepts and principles how to control protozoan infections

Course Description    The course includes Introduction to microbiology, theories on origin of microorganisms, classification of microorganisms, morphology and cytology of bacteria, host parasite relationship, common pathogenic bacteria, introduction to immunology, introduction to mycology and virology

Pre-requisite(s)        Medical Physiology , Medical Biochemistry and Human Anatomy

Course status            Supportive

Course outline and schedules

| Week                                   | Date | Contact hours | Topics   | Reference materials   |
|--|------|---------------|--|---|
| 1 <sup>st</sup> - 2 <sup>nd</sup> week |      | 4hrs          | <p>1</p> <p>Introduction to Medical Microbiology</p> <p><i>Enabling objectives</i></p> <ul style="list-style-type: none"> <li>• Define microbes in the words of Leeuwenhoek and</li> </ul> | <p><u>Burton's Microbiology for the Health Sciences, Ninth Edition, 2011 (chap 1)</u></p> |

as we know them today.

- Compare & contrast prokaryotic and eukaryotic cells
- Compare and contrast the structures and functions of fimbriae, pili, and flagella
- Compare and contrast the cell walls of acid-fast bacteria with typical Gram-positive cell walls
- Describe the relationships among the terms parasite, host, and pathogen
- Identify and describe the portals through which pathogens invade the body
- Compare and contrast the terms infection, disease, morbidity, pathogenicity, and virulence

Hugo and Russell's

Pharmaceutical

Microbiology, 2004 Murray

PR. et al., Medical

Microbiology, 4<sup>th</sup> ed. Chapt  
3 & 4.

#### Topics (to be lectured)

- Definition of microbiology
- Theories and origin of
- microorganisms
- The germ theory of diseases
- Classification of
- microorganisms
- Morphology and cytology of
- bacteria

- nutrition and growth of bacteria
- Disinfection and sterilization
- Host parasite relationships
- Anti-microbial chemotherapy

Laboratory Practice (12 Hrs)

- ❖ Demonstration of microbiology and parasitology laboratory(3Hrs)
- ❖ Simple staining (3Hrs)
- ❖ Gram staining(3Hrs)
- ❖ Zehl-nelson staining(3Hrs)

Reading assignment

- ❖ *Glucose metabolism in bacteria*
- ❖ *Mechanism of action of anti-protozoan drugs*
- ❖ *Mechanism of action of anti-fungal drugs*
- ❖ *Mechanism of action of anti-helminthic drugs*

2<sup>nd</sup>

1<sup>st</sup> written Examination (10%)

week

1<sup>st</sup> practical examination (3%)

3<sup>rd</sup>-6<sup>th</sup>  
week

8      General Immunology  
hrs    *Enabling objectives*

Roitt's Essential  
immunology,2006

- List and briefly describe the three lines of defense in the human body.
- Define normal microbiota, and explain how they help provide protection against disease
- Discuss about immune cells and their functions in the body's defense
- Name and describe the six stages of phagocytosis
- Discuss the process and benefits of inflammation
- Describe five distinctive attributes of adaptive immunity
- List two basic divisions of adaptive immunity, and describe their targets

#### Topics

#### Introduction to immunology

- ❖ Cells and tissues of the immune system
- ❖ The basis of immunity(Innate immunity, Adaptive immunity
  - Cell mediated

## immunity

### ▪ Humoral immunity

- ❖ The recognition of antigen  
,the acquired immune  
response classification and  
types of acquired immunity
- ❖ Antigens antibodies and  
complement system
- ❖ Types of antigens
- ❖ Immunoglobulins
- ❖ Cellular basis of antibody  
formation
- ❖ Antigen antibody reaction
- ❖ Haptens and  
immunoglobulins
- ❖ The major histocompatibility  
complex(MHC type I and II)
- ❖ Immunodeficiency  
(secondary to drugs nutrition  
,AIDS)
- ❖ Allergic  
diseases(hypersensitivity  
reactions, anaphylaxis and  
urticaria, drug allergy)

Reading assignment

*Immunity to bacterial infections*

2<sup>nd</sup> Examination

Written examination (10%)

week 7

|         |       |   |   |
|---------|-------|---|---|
| Week 7  | 10Hrs | Common pathogenic Bacteria  | Harrisons infectious  |
| week 8  |       | Enabling objectives   | diseases,( Derived from   |
| Week 9  |       | <ul style="list-style-type: none"> <li>Discuss the virulence factors of Staphylococcus that enable it to be pathogenic, contrasting the virulence of <i>S. aureus</i> with that of <i>S. epidermidis</i></li> </ul>   | Harrison's Principles of Internal Medicine, 17th Edition),2010 ,page 353                                    |
| Week 10 |       | <ul style="list-style-type: none"> <li>Topics <ul style="list-style-type: none"> <li>➤ Staphylococci</li> <li>➤ Streptococcus and pneumococcus</li> <li>➤ Bacillus ,clostridia nad coryebactera</li> <li>➤ Enterobacteriaceae</li> <li>➤ vibrio</li> <li>➤ Nesireia</li> <li>➤ Hemophilus</li> <li>➤ Neisera</li> <li>➤ Hemophilus,Bordetella and Brucella</li> <li>➤ Mycobacteria</li> <li>➤ Spirochetes</li> <li>➤ Rikettsiae</li> <li>➤ Chlamydia</li> </ul> </li> </ul> | Solomon Geber-selassie et al. Medical microbiology and immunology for health science student's series. 2004 |
| Week 11 |       | Laboratory Practice <ul style="list-style-type: none"> <li>❖ Preparation of culture media(3Hrs)</li> <li>❖ Specimen inoculation(3Hrs)</li> <li>❖ Identification (3Hrs)</li> </ul>   | Patrick Murray.Ken et al. Medical microbiology 4 <sup>th</sup> ed 2002                                      |



- ❖ Drug Sensitivity  
Testing(3Hrs)
- ❖ Demonstration of preserved  
slides for Boriella species  
and acid fact bacilli(3Hrs)
- ❖ Widal test (3Hrs)

Reading assignment

- ❖ *Genus Legionella and  
listeria*
- ❖ *Serologic tests used for the  
diagnosis bacterial  
infections*

Week

12

Examination 3

Written examination (20%)

Practical examination (7%)

Week

13

2 Hrs

Introduction to Mycology

*Enabling objectives*

- Define the term Mycology
- List the characteristics of  
fungi

Topics to be lectured (2Hrs)

- Definition of fungus
- Superficial mycoses
- Cutaneous mycoses
- Subcutaneous mycoses
- Systemic mycoses
- Opportunistic mycoses

Laboratory Practice (6Hrs)

- ❖ KOH examination(3Hrs)
- ❖ Demonstration of fungus

culture and drug sensitivity  
testing (3Hrs)

3<sup>rd</sup> examination

| Week  | Nov_to_ |      | Introduction to virology  |  |
|-------|---------|------|---|--|
| 14-16 |         | 6Hrs | <ul style="list-style-type: none"> <li>• general properties of virus</li> <li>• viral pathogens diagnosis and control of viral disease</li> <li>• Specific Virology</li> <li>• RNA viruses(Influenza virus, parainfluenza virus, respiratory syncytial virus, measles virus, mumps virus, rubella virus, rabies virus, human T-cell lymphotropic virus, human immunodeficiency virus, hepatitis C virus)</li> <li>• DNA viruses(Herpesviruses (herpes simplex virus types 1 and 2, varicella-zoster virus, cytomegalovirus, Epstein-Barr virus, human herpesvirus 8), hepatitis B virus, smallpox virus)</li> </ul> | <p>Leslie Collier Human Virology 3<sup>rd</sup> edition</p> <p>Murray PR. et al., Medical Microbiology, 4<sup>th</sup> ed.</p> |

Reading assignment

*Hepatitis A virus, Hepatitis D ,  
Hepatitis G virus ,polio virus*

|      |   |
|------|---|
| Week | Final Examination (50%)                       |
| 17   | <u>Exam type</u>                              |
|      | Multiple choice question (20%)                |
|      | True/ false question (5%)                     |
|      | Matching (5%)                                 |
|      | Short answer Question (10%)                   |
|      | Essay question (10%)                          |
|      | Bonus question(3%-composed of essay question) |

| Week                              | Lecture Topics of Parasitology   | Contact Hours | Reading Materials  |
|-----------------------------------|--|---------------|--|
| 1 <sup>st</sup> `                 | 1. Chapter I- Introduction to Medical Parasitology <ul style="list-style-type: none"> <li>• Features of parasites</li> <li>• Source of infection</li> <li>• Mode of transmission</li> <li>• Direct mode of transmission</li> <li>• Indirect mode of transmission</li> <li>• Routes of transmission</li> <li>• General life cycle of parasites               <ul style="list-style-type: none"> <li>• Direct life cycle</li> <li>• Indirect life cycle</li> </ul> </li> </ul> | 1             | Judith S. Heelan, Frances W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning<br>Markell, Voge, Jhon. Medical Parasitology. 6th ed. 1986. W.b. Saunders company.<br>David L. Belding. Text book of Parasitology. 3rd ed. 1965. |
| 2 <sup>nd</sup> & 3 <sup>rd</sup> | Chapter II - Nemathelminthes /Round worms/ <ul style="list-style-type: none"> <li>○ General characteristics</li> <li>○ Classification (Intestinal &amp; tissue)               <ul style="list-style-type: none"> <li>▪ Intestinal round worms                   <ul style="list-style-type: none"> <li>• <i>Ascaris lumbricoides</i></li> <li>• <i>Trichuris trichura</i></li> </ul> </li> </ul> </li> </ul>   | 2             | Monica Cheesbrough. District Laboratory Practice in Tropical countries. Part I -2nded updated. 1998.<br>Tropical Health Technology. Cambridge<br>Judith S. Heelan, Frances   |

- *Enterobius vermicularis*
- *Ancylostoma duodenale*
- *Necator americanus*
- *Strongyloides stercoralis*

#### Assignment I

- Tissue round worms
  - *Wuchereria bancrofti*
  - *Onchocerca volvulus*
  - *Trichinella spiralis*

4<sup>th</sup> &  
5<sup>th</sup>

#### Chapter III –Platyhelminthes

2

##### Cestodes /The tape worms/

- General characteristics
  - *Taenia saginata*
  - *Taenia solium*
  - *Hymenolepis nana*
  - *Echinococcus granulosus*

##### Trematodes /The flukes/

- General characteristics
- Classification (blood, liver & intestinal flukes)
  - Blood flukes
    - *Schistosoma mansoni*
    - *Schistosoma haematobium*

#### Mid Exam

W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning  
Mohammed AwolAdem and WaqtolaCheneke. Medical Parasitology: Lecture note for medical laboratory technology students: upgraded lecture note serious. 2006

Monica Cheesbrough. District Laboratory Practice in Tropical countries. Part I -2nd ed updated. 1998.

Tropical Health Technology. Cambridge

Judith S. Heelan, Frances W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning

Mohammed AwolAdem and WaqtolaCheneke. Medical Parasitology: Lecture note for medical laboratory technology students: upgraded lecture note serious. 2006

Markell, Voge, John. Medical Parasitology. 6th

|                 |  |   |  |
|-----------------|--|---|--|
| 6 <sup>th</sup> | Chapter IV – Introduction  | 1 | <p>ed. 1986. W.b. Saunders company</p> <p>David L. Belding. Text book of Parasitology. 3rd ed. 1965</p> <p>Monica Cheesbrough. District Laboratory Practice in Tropical countries. Part I -2nded updated. 1998. Tropical Health Technology. Cambridge</p> <p>Judith S. Heelan, Frances W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning</p> <p>Mohammed AwolAdem and WaqtolaCheneke. Medical Parasitology: Lecture note for medical laboratory technology students: upgraded lecture note serious. 2006</p> <p>Markell, Voge, Jhon. Medical Parasitology. 6th ed. 1986. W.b. Saunders company</p> <p>David L. Belding. Text</p> |
|                 | <ul style="list-style-type: none"> <li>▪ Protozoa</li> <li>▪ General Morphology</li> <li>▪ Life Cycle</li> <li>▪ Classification</li> </ul> |   |  |

7<sup>th</sup>

1

## Chapter V - The Amoeba:

### Alimentary canal

- General *characteristics*
  - *Entamoeba histolytica/dispar*

book of Parasitology. 3rd ed. 1965

Monica Cheesbrough. District Laboratory Practice in Tropical countries. Part I -2nded updated. 1998.

Tropical Health Technology. Cambridge

Judith S. Heelan, Frances W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning

Mohammed AwolAdem and WaqtolaCheneke. Medical Parasitology: Lecture note for medical laboratory technology students: upgraded lecture note serious. 2006

Markell, Voge, Jhon. Medical Parasitology. 6th ed. 1986. W.b. Saunders company

David L. Belding. Text book of Parasitology. 3rd ed. 1965

Monica Cheesbrough. District Laboratory Practice

8<sup>th</sup> &

3

10<sup>th</sup>

## Chapter VI - Flagellate Protozoa:

## Digestive and urogenital tract

- General *characteristics*
  - *Giardia lamblia*
  - *Trichomonas vaginalis*

## Hemoflagellates / Blood and Tissue/

- i. The Leishmania
  - a. *Leishmaniatropica complex*
  - b. *L. tropica minor*
  - c. *L. tropica major*
  - d. *L. aethiopica*
- ii. Leishmaniamexicana complex
  - a. *L. m. mexicana*
  - b. *L. m. Amazonensis*
  - c. *L. M. pifanoi*
- iii. Leishmaniabraziliensis complex
  - a. *L. B. braziliensis*
  - b. *L. B. guyanensis*
  - c. *L. B. panamensis*
  - d. *L. peruviana*
- iv. Leishmaniadonovani complex
  - a. *L. d. donovani*
  - b. *L. d. chagasi*
  - c. *L. infantum*
- v. The Trypanosome
  - a. Trypanosoma brucei complex
    - i. *T. b. Gambiense*
    - ii. *T. b. Rhodesiense*

in Tropical countries. Part I  
-2nded updated. 1998.

Tropical Health

Technology. Cambridge

Judith S. Heelan, Frances  
W. Ingersoll. Essentials of  
Human Parasitology. 2002.  
Delmar Thomson Learning

Mohammed AwolAdem and  
WaqtolCheneke. Medical  
Parasitology: Lecture note  
for medical laboratory  
technology students:  
upgraded lecture note  
serious. 2006

Markell, Voge, Jhon.  
Medical Parasitology. 6th  
ed. 1986. W.b. Saunders  
company

David L. Belding. Text  
book of Parasitology. 3rd  
ed. 1965

11<sup>th</sup> -  
15<sup>th</sup>

## Chapter VII – Apicomplexa

### The Plasmodium Species

- General characteristics
  - *Plasmodium falciparum*
  - *Plasmodium vivax*
  - *Plasmodium malariae*
  - *Plasmodium ovale*
- Drug resistance in malaria

### The Coccidia and related Protozoa

- General characteristics
  - Genus *Cryptosporidium*
  - Genus *Isospora*
  - Genus *Sarcocystis*
  - Genus *Toxoplasma*
  - Genus *Pneumocystis*

4

Monica Cheesbrough.  
District Laboratory Practice  
in Tropical countries. Part I  
-2nd ed. updated. 1998.  
Tropical Health  
Technology. Cambridge

Judith S. Heelan, Frances  
W. Ingersoll. Essentials of  
Human Parasitology. 2002.  
Delmar Thomson Learning

Mohammed Awol Adem and  
Waqtola Cheneke. Medical  
Parasitology: Lecture note  
for medical laboratory  
technology students:  
upgraded lecture note  
series. 2006

Markell, Voge, Jhon.  
Medical Parasitology. 6th  
ed. 1986. W.b. Saunders  
company

David L. Belding. Text  
book of Parasitology. 3rd  
ed. 1965

16<sup>th</sup>

Final Exam



| Course Hours | Lecture | Tutorial | Lab practice | Home study Individual work | Total |
|--------------|---------|----------|--------------|----------------------------|-------|
|              | 16      | 6        | 0            | 17                         | 39    |

### Teaching Methods, Assessments, Course Expectation, Policy and References

#### Teaching and learning methods

- Classroom contact/Lecture
- Presentation and group discussion
- Computer assisted instruction

#### Assessment

- Four individual assignments 10%
- Two exams (15%)
  - Exam 1 15% week 7
  - Exam 2 15 % week 10
- Mid Exam 30%.
- Final exam 40 % Week 16

#### Reference

- Markell, Voge, Jhon. Medical Parasitology. 6<sup>th</sup> ed. 1986. W.b. Saunders company.
- Paul Chester Beaver, Rodney Clifton jung, Eddie Wayne Cupp. Clinical Parasitology. 9<sup>th</sup> ed. 1984. K.M. Varghese company
- Herbert M. Gilles. Protozoal Diseases. 1999. Arnold
- David L. Belding. Text book of Parasitology. 3<sup>rd</sup> ed. 1965.
- Monica Cheesbrough. District Laboratory Practice in Tropical countries. Part I -2<sup>nd</sup>ed updated. 1998. Tropical Health Technology. Cambridge
- Judith S. Heelan, Frances W. Ingersoll. Essentials of Human Parasitology. 2002. Delmar Thomson Learning
- VigarZaman. Atlas of Medical Parasitology. 1979
- Harold W. Brown, Franklin A. Neva. Basic Clinical Parasitology. 5<sup>th</sup> ed.

1983

- Mohammed AwolAdem and WaqtolaCheneke. Medical Parasitology: Lecture note for medical laboratory technology students: upgraded lecture note serious. 2006
- Modern Parasitology A text book of Parasitology ( Cox 2<sup>nd</sup>edn)
- Clinical parasitology (Beaver et. al 9<sup>th</sup>ed.)
- Atlas of Medical Helminthology and Protozoology (Jaffee and Leach 2<sup>nd</sup> edition)
- District laboratory practice in tropical counties (Monica CheesbroughVol I)
- Essentials of Parasitology (Murray D. Dailey 6<sup>th</sup> ed. 1996)
- Essentials of parasitology (Gerald D. Schmidt 4<sup>th</sup> ed. 1994)
- Parasitology for medical Laboratory Technology students – Lecture note series (GirmaM. and Mohammed A. 2003)
- Craig ad Faust’s clinical parasitology (Ernest C. Faust 8<sup>th</sup> ed. 1977)
- Web materials - DPDx

**Module code:05- Biomedical Science II module**

**Course title: General Pathology**

**Course code: 2054**

**Course EtCTS: 5 (135 hrs)**

- Lecture: 48 hours
- Tutorial: 9 hours
- Home study: 60 hours
- Assignment and presentation: 18 hours
- Contact hours/ week:  $135 = 48 \text{ hours} / 16 \text{ weeks} = 3 \text{ hours}$

**Pre-requisite if any:** Physiology, Biochemistry

**Course description:**

This General Pathology course is designed to help B.Pharm students to better understand pharmacotherapy of both communicable and non communicable diseases which will prepare them to be competent providers of pharmaceutical service. Students will be able to explain the concepts of pathology and the pathophysiology of cellular injury, wound healing, hemodynamics of cardiovascular diseases, immunopathology, neoplasia, endocrine disorders, common infectious diseases and CNS disorders.

**Course objectives:**

- After completing this course, the student will be able to:
  - Define pathology and describe core aspects of disease in pathology
  - Describe Cellular Reaction to Injury
  - Explain causes and process of inflammation
  - Describe process and Pattern of Healing
  - Understand Hemodynamic Disorders
  - Describe basis and categories Genetics Disease
  - Understand etiologic factors in autoimmune disease
  - Explain the etiology, pathogenesis and clinical features of infectious disease
  - Describe metabolic disease like diabetes mellitus, thyroid diseases and adrenal disorders
  - Explain pathophysiology, diagnostic modalities , staging and grading of common cancers/neoplasm

- Explain the pathophysiology of CNS disorders

**Course contents**

1. Pathophysiology basics (2 hrs)
  - 1.1 Definition of pathology
  - 1.2 Structure, reproduction, aging and apoptosis of cells
  - 1.3 Homeostasis and effects of diseases on homeostasis
  - 1.4 Core aspects of disease in pathology
  - 1.5 Diagnostic techniques used in pathology
  - 1.6 Various categories of the causes of diseases
  - 1.7 Course, outcome, consequences of diseases
2. Cellular Reaction to Injury (3 hrs)
  - 2.1 Hyperplasia, hypertrophy, atrophy, & Metaplasia
  - 2.2 Reversible & irreversible forms of cell injury
  - 2.3 Mechanisms of necrosis
  - 2.4 Types and causes of necrosis
3. Inflammation (4 hrs)
  - 3.1 Causes of inflammation
  - 3.2 Process of inflammations
  - 3.3 Etiopathogeneses of granulomatous inflammations
  - 3.4 Acute and chronic inflammations
4. Healing (3 hrs)
  - 4.1. Processes of healing
  - 4.2. Patterns of wound healing
  - 4.3. Factors influencing wound healing
  - 4.4. Complications of wound healing
  - 4.5. Fracture healing
5. Hemodynamic Disorders (5 hrs)
  - 5.1. Maintenance of fluid balance by Starling forces
  - 5.2. Cause and pathogenesis of ischemia, infarction, thrombosis, embolism, DIC
  - 5.3. Pathogenesis of edema of congestive heart failure, nephrotic syndrome, cirrhosis

- 5.4. Types, pathogenesis, manifestations and complications of shock
- 6. Genetics Disease (4hrs)
  - 6.1. Basis of genetic diseases
  - 6.2. Categories of genetic diseases
  - 6.3. Categories of Mendelian disorders based on their pattern of inheritance
  - 6.4. Categories of Mendelian disorders based on the type of protein involved (i.e. the biochemical mechanism)
  - 6.5. Types of chromosomal disorders
  - 6.6. Multifactorial disorders
- 7. Immunopathology (5 hrs)
  - 7.1. Mechanisms and examples of hypersensitivity reaction
  - 7.2. Etiologic factors in autoimmune disease
  - 7.3. Concept on immunodeficiency states
- 8. Selected Infectious Diseases (7 hrs)
  - 8.1. Etiology, pathogenesis and clinical features of :
    - 8.1.1. Typhoid fever
    - 8.1.2. Typhus
    - 8.1.3. Relapsing fever
    - 8.1.4. Osteomyelitis
    - 8.1.5. Pneumonia
    - 8.1.6. Tuberculosis and leprosy
    - 8.1.7. Syphilis
    - 8.1.8. Bacterial meningitis
    - 8.1.9. HIV/AIDS
    - 8.1.10. Cryptococcal meningitis
    - 8.1.11. Aspergillosis
    - 8.1.12. Histoplasmosis
    - 8.1.13. Malaria
    - 8.1.14. Leishmaniasis
    - 8.1.15. Schistosomiasis

## 9. Metabolic Diseases (4 hrs)

- 9.1. Classification of DM and the basis for the classification.
- 9.2. Criteria for the diagnosis of DM
- 9.3. Pathogenesis of type 1 and type 2 DM
- 9.4. Clinical manifestation of DM
- 9.5. Complications of DM
- 9.6. Pathogenesis of thyroid disorders (hypothyroidism and hyperthyroidism)
- 9.7. Pathogenesis of adrenal disorders (Cushing's syndrome, adrenal insufficiency)

## 10. Neoplasm (7hrs)

- 10.1. Causes of abnormal cell growth
- 10.2. Differences between benign and malignant tumors
- 10.3. Warning signs of cancer
- 10.4. Methods and mechanisms of metastasis
- 10.5. Classifications of cancer
- 10.6. Etiologic factors in carcinogenesis
- 10.7. Clinical effects of neoplasms
- 10.8. Pathophysiology, diagnostic modalities , staging and grading of common cancers  
(breast, prostate, lung, colorectal, leukemia, lymphoma, skin, ovarian, cervical ca)

## 11. Diseases of CNS (4 hrs)

- 11.1. Pathophysiology of degenerative disorders (Parkinsonism, Alzheimer, MS, ALS)
- 11.2. Classification and pathogenesis of epilepsy
- 11.3. Pathophysiology of psychiatric disorders (anxiety, depression, mania, OCD, schizophrenia)
- 11.4. Acute alcohol intoxication and chronic alcoholism

### **Delivery mode/methodology:**

- Active learning methods (brain storming, group discussion, etc),
- Lecture
- Group and individual presentation
- Assignment

**Assessment mechanisms:** Continuous assessment & summative assessment

- Quiz (10%)
- Test (15%)
- Assignments (15%)
- Mid exam (20%)
- Final Exam (40%)

**Learning Materials**

- Lecture notes
- Audiovisual aids: Computer & LCD
- Textbooks

**References:**

1. Cotran RS, Kumar V, Collins T. Robbins pathologic basis of diseases. Philadelphia, J.B. Saunders Company. Latest edition
2. Emanuel Rubin, and John L. Farber, Essential Pathology, Philadelphia, Latest edition
3. William Boyd; Textbook of Pathology, structure and Function in disease, Philadelphia, Latest edition
4. James E. Pointer; Alan B. Fletcher; Basic life support, California, Latest edition
5. F.B. Walter and M.S Israel; General Pathology, Churchill Livingstone Edinburgh and London, Latest edition
6. Macfarlane, Reid, callander, Illustrated Pathology, Churchill Livingstone, Latest edition
7. Muir's Textbook of Pathology Latest edition
8. Lecture note on General Pathology for Health Science Students, 2004

## **Module 06: Biostatistics and Epidemiology**

**Module name: Biostatistics and Epidemiology module**

**Module category:** Basic

**Module code:** BiepM2061

**Module Number: 06**

**Module weight in EtCTS: 6 ECTS**

**Courses: Biostatistics (Com-H2061) (3 ECTS) and Epidemiology (Com-H2062) (3 ECTS)**

**Module description:** This module will introduce students the principles and concept of Biostatistics and epidemiology.

**Module competency:** Involve in research and public health promotion

**Mode of delivery:** Block

**Module objectives:** At the end of this module students will be able to:

- Analyze data using various statistical techniques and soft wares
- Understand the principles of Epidemiology and biostatistics

### **Module learning teaching methods**

#### **Learning activities and teaching methods**

##### **A. Learning Activities**

Students are expected to undertake among others the following major learning activities:

- Engage in learning by doing (independent study, group assignments, presentation, report writing, and etc...)
- Participation and note takings during class lectures and debates and discussions;
- Analysis, summarization and presentations of chapter/article, motions on selected issues;

##### **B. Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give
- references, facilitate discussions, ask questions, give and correct assessments,
- Arrange and facilitate seminar sessions by inviting professionals for public lectures or debates on subject related issues.



**Course title: Biostatistics**

**Course Code: Com-H2061**

**Course ECTS: 3 ECTS**

Course Objectives:

At the end of this course students should be able to:

- Describe the different types and methods of data collection and identify advantages and limitations of the different methods
- Outline the steps in designing a questionnaire and identify the different interviewing techniques
- Describe the different methods of data organization and summarization and identify the advantage and disadvantages of the different methods
- Describe the different measures of mortality and fertility
- Compute probability of an event and composite events
- Identify type of events
- Describe commonly used probability distributions of discrete and continuous random variables
- Identify the different sampling methods
- Identify the different estimation techniques in one and two samples situation
- Estimate sample size for cross-sectional study
- Do test of hypothesis on means and proportions in one and two sample situations

Mode of delivery: Parallel

Course Hours

- Lecture:- 32 hours
- Tutorial:- 12 hours
- Home study : 30 hours
- Assessment : 7 hours

## Contents:

1. Introduction
2. Methods of data collection
  - 2.1. Data types and measurement scales
  - 2.2. Data collection methods
  - 2.3. Questionnaire design and interviewing techniques
3. Methods of data processing, organization, presentation and summarization
  - 3.1. Tables and diagrams
  - 3.2. Measures of central tendency
  - 3.3. Measures of variation
4. Demographic statistics
5. Introduction to probability
  - 5.1 Rules of probability and types of events
  - 5.2 Probability distributions : binomial and normal distributions
6. Introduction to Sampling
  - 6.1 Non-probability sampling techniques
  - 6.2 Probability sampling techniques
7. Estimation techniques – point and interval estimation on one and two sample situation of means and proportions and sample size estimation for cross sectional study
8. Test of hypothesis: Type I and Type II errors, Power of the test, Critical and P-value methods, test on means and proportions in one and two sample situation

## References

1. Daniel, W.W., 1991. Biostatistics: a foundation for analysis in health Sciences, 5<sup>th</sup> ed. John Willy & Sons, New York
2. Getu Degu and Fasil Tessema, 2003. Biostatistics for Health Science Students. Lecture Note Series. The Carter Center
3. Douglas G. Altman, 1991. Practical Statistics for Medical Research. Chapman & Hall
4. Bernard Rosner, 1995. Fundamentals of Biostatistics. 4<sup>th</sup> ed. Duxbury Press
5. Theodore Colton, 1974. Statistics in Medicine. Little, Brown and Company
6. Betty R. Kirkwood, 1988. Essentials of Medical Statistics. Blackwell Science ltd
7. Richard D. Remington, M. Anthony Schork, 1985. Statistics with Applications to Biological and Health Sciences, 2<sup>nd</sup> ed. Prentice Hall, New Jersey, USA
8. Abramson J. H., 1990. Survey Methods in Community Medicine. Epidemiological Studies Programme Evaluation Clinical Trials. 4<sup>th</sup> ed. Churchill Livingstone.
9. William G. Cochran, 1977. Sampling Techniques. 3<sup>rd</sup> ed. John Willy & Sons Inc.
10. Lwanga, S.K. and Lemeshow, S., 1991. Sample size determination in health studies. A practical Manual. World Health Organization, Geneva

## Epidemiology course syllabus for Pharmacy Students

**Course title: Epidemiology**

**Course code: Com-H 2062**

**Course ECTS credits: 3 ECTS**

Course Hours:

- Lecture:- 32 hours
- Tutorial:- 12 hours
- Home study : 30 hours
- Assessment : 7 hours

Pre-requisite: none

*Course description:* This course is designed to equip students with the basic concepts of epidemiology (definition of epidemiology), communicable disease epidemiology, measures of disease occurrence, establishment of disease causation, epidemiological study designs, outbreak investigation and management, screening in disease control and epidemiological surveillance.

### *Course objectives*

At the end of the course the student will be able to:

- Understand the principles of Epidemiology
- Describe concepts of disease causation
- Calculate the measures of disease and death
- Understand types of study design
- Investigate and control outbreaks and epidemics
- Describe the purpose and types of surveillance
- Understand the factors that affect validity of studies

## Schedule of contact time, contents/topics and reading/reference materials for each topic

| Week    | Contact hrs/week | Topic/subtopic chapter   | Reading materials  | Remark |
|---------|------------------|--|--|--------|
| 1       | 3                | <p>Introduction to Epidemiology</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• History of Epidemiology</li> <li>• Use/applications of Epidemiology</li> <li>• Scope of epidemiology</li> <li>• Basic assumptions of epidemiology</li> <li>• Theories disease causation</li> <li>• Levels of disease occurrence</li> <li>• Branches of epidemiology</li> </ul>  | <p>Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: definition and background and design strategies in epidemiologic research. Lippincott Williams and Wilkins, USA. 1987;p(1-16)</p> <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 2 and 3. Ethiopia. 2003; p(10-28)</p> |        |
| 2       | 3                | <p>Natural history of disease and levels of prevention</p> <ul style="list-style-type: none"> <li>• natural history of disease</li> <li>• stages in the natural history disease</li> <li>• levels of disease prevention</li> <li>• applications to common diseases</li> </ul>  | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 4. Ethiopia. 2003; p(29-38)</p>   |        |
| 3       | 3                | <p>The infectious disease cycle</p> <ul style="list-style-type: none"> <li>• agent</li> <li>• reservoir</li> <li>• portal of exit</li> <li>• modes of transmission</li> <li>• portal of entry</li> <li>• host</li> <li>• spread of disease through person to person transmission</li> <li>• infection vs. disease</li> <li>• time course of an infectious disease</li> <li>• carries and their role in disease transmission</li> <li>• individual and herd immunity</li> </ul> | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 5. Ethiopia. 2003; p(39-48)</p>   |        |
| 4 and 5 | 6                | <p>Basic measurement in epidemiology</p> <ul style="list-style-type: none"> <li>• Number , ratio, proportion , and rate</li> <li>• Measures of morbidity -incidence and prevalence</li> <li>• Measures of mortality</li> </ul>   | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 7. Ethiopia. 2003; p(57-77)</p>   |        |

- crude vs. specific rates
- Standardization of rates

|           |   |   |  |
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| 6         | 3 | Source of epidemiologic data <ul style="list-style-type: none"> <li>• Census</li> <li>• Vital records</li> <li>• Data from health institutions</li> <li>• Data from morbidity surveys</li> <li>• Other sources</li> </ul>                             | Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 6. Ethiopia. 2003; p(49-56)  |
| 7         | 3 | Public health surveillance <ul style="list-style-type: none"> <li>• Definition</li> <li>• Purpose of surveillance</li> <li>• Types of surveillance</li> <li>• Activities in surveillance</li> <li>• Modifiable diseases</li> </ul>                    | Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 12. Ethiopia. 2003; p(153-169)   |
| 8 and 9   | 6 | Descriptive study designs <ul style="list-style-type: none"> <li>• Purpose of descriptive studies</li> <li>• Types of descriptive study designs</li> </ul>  | Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 8. Ethiopia. 2003; p(78-90)  |
|           |   |   | Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: types of epidemiologic studies: descriptive studies. Lippincott Williams and Wilkins, USA. 1987;p(101-132)                              |
| 10 and 11 | 6 | Analytical epidemiology <ul style="list-style-type: none"> <li>• Purpose of analytical epidemiology</li> <li>• Observational analytic study designs vs. experimental analytical studies</li> </ul>  | Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 9. Ethiopia. 2003; p(91-106)   |
|           |   | <ul style="list-style-type: none"> <li>• Case control studies</li> <li>• Cohort studies</li> <li>• Cross sectional studies</li> <li>• Intervention studies</li> <li>• Types of intervention studies</li> <li>• Analysis and interpretation</li> </ul> | Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: types of epidemiologic studies: case control, cohort and interventional studies. Lippincott Williams and Wilkins, USA. 1987;p(133- 215) |

|                 |   |   |  |
|-----------------|---|---|--|
| 12<br>and<br>13 | 6 | Measures of strength of association   | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 9. Ethiopia. 2003; p(107-118)</p> <p>Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: measures of disease frequency and association. Lippincott Williams and Wilkins, USA. 1987;p(54-100)</p> |
| 14              | 3 | <p>Analysis of cause effect relationship</p> <ul style="list-style-type: none"> <li>• Validity of studies</li> <li>• Role of chance</li> <li>• Role of bias</li> <li>• Role of confounding factors</li> <li>• Evaluation of overall evidence for a cause-effect relationship</li> </ul>   | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 10. Ethiopia. 2003; p(119-133)</p> <p>Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: analysis of cause effect relationship. Lippincott Williams and Wilkins, USA. 1987;p(30-53)</p>         |
| 15              | 3 | <p>Screening in disease control</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Diseases appropriate for screening program</li> <li>• Criteria for establishing screening program</li> <li>• Validity and reliability of tests</li> <li>• Sensitivity and specificity</li> <li>• Predictive value of a test</li> </ul> | <p>Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 13. Ethiopia. 2003; p(170-179)</p> <p>Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. In: screening. Lippincott Williams and Wilkins, USA. 1987;p(327-350)</p>                                   |

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| 16 | 3 | Investigation of an epidemic  | Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series. In: chapter 11. Ethiopia. 2003; p(134-152) |
|    |   | <ul style="list-style-type: none"> <li>• Definition of terms (endemic, hypo-endemic, hyper-endemic, holo-endemic, cluster of cases, outbreak, epidemic, pandemic)</li> <li>• Types of epidemics</li> <li>• Steps in epidemic investigation</li> <li>• Prevention and control strategies of epidemics</li> </ul> |  |

Delivery mode/method: brain storming, buzz group, discussion, Lecture, group and individual presentation, assignment

Assessment mechanisms:

- Class participation, quizzes, assignment, [50%], and
- Final exam (50%)

## References

- Charles H. Hennekens, DrPH. Julie E. Buring, Sc D. Epidemiology in medicine. Lippincott Williams and Wilkins, USA.
- Kifle Wolde Michael, Yigzaw Kebede, Kidist Lulu. Epidemiology for health science students: Lecture Note Series.
- Lilienfield, MA. Lilienfield ED. *Foundations of epidemiology*, 1980, Oxford University Press, New York.
- Zein Ahmed Zein and H. Kloos. *The Ecology of Health and Disease in Ethiopia*, 1993.

**Federal Ministry of Education and Higher Education Institutions' Partnership sub-Forum Against HIV/AIDS in Ethiopia, April 30, 2016**

**Final Harmonized Course Syllabus**

|                      |  |
|----------------------|--|
| <b>Course Title:</b> | <b>HIV/AIDS , SRH and Life Skills</b>  |
| Course code          | BSHL 1011  |
| Placement            | Parallel, 1 <sup>st</sup> year;1 <sup>st</sup> Semester;   |
| Course Owner         | Public Health, Psychology and Sociology  |
| Credit Hour          | 3 Cr Hrs. (5ECTS)  |
| Pre-requisite        | None   |
| Course Description   | This course gives students enrolled in the undergraduate programs a framework about the basic concepts related to comprehensive sexual reproductive health, HIV/AIDS, gender issues and Life skills education. It is further designed to equip students with knowledge, skills and attitudes needed to prevent and bring positive behavioral changes on oneself and others on these Issues. Moreover, it will enable them to contribute to the combat HIV/AIDS and contributing factors. |

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| Objective | <p><b>Objectives of the course</b></p> <p>At the end of this course, students will be to:</p> <ul style="list-style-type: none"> <li>➤ acquire basics of HIV/AIDS ;</li> <li>➤ analyze the causes and consequences of SRH problems, GBV and their relationship with HIV&amp; AIDS;</li> <li>➤ know contribution of Gender Based Violence (GBV) in spreading HIV and STIs; and</li> <li>➤ apply Principles of Life Skill strategies in fighting HIV/AIDS/STI,SRH problems and GBV Issues.</li> </ul> |  |
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| Contents | Contents | Methods | Assessment |
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| <p><b>Chapter One :</b></p> <p><b>BASICS OF HIV/AIDS</b></p> <p><b>OBJECTIVE</b></p> <p>At the end of this chapter, students will be able to :</p> <ul style="list-style-type: none"> <li>• Identify magnitude of HIV/AIDS</li> </ul> | <p><b>Contents</b></p> <ul style="list-style-type: none"> <li>✓ Overview of HIV/AIDS <ul style="list-style-type: none"> <li>○ Defining common terminologies</li> <li>○ History of HIV /AIDS</li> <li>○ Basic concepts/Facts about HIV/AIDS</li> <li>○ Magnitude and Current status ( Global, SSA , National, HEI)</li> <li>○ Major Impacts of HIV/AIDS</li> <li>○ HIV/AIDS, Culture, Poverty and Development</li> <li>○ Responses to HIV/AIDS</li> </ul> </li> <li>✓ Mode of transmission</li> </ul> | <p><b>Methods</b></p> <p>Brainstorming</p> <p>PBL</p> <p>Case Study</p> <p>Role play</p> <p>Discussion</p> <p>Demonstration</p> | <p><b>Assessment method</b></p> <p>(refer the curricular mainstreaming manual &amp; guideline distributed to all HEIs during the TOT for</p> |
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| <ul style="list-style-type: none"> <li>• Distinguish the differences between HIV and AIDS.</li> <li>• Describe Risk and Vulnerability factors related to HIV/AIDS</li> <li>• Explain the modes of HIV/AIDS transmissions and Preventions</li> <li>• Explain the major impacts of HIV/AIDS at different levels( quality of education, health, family, development, etc.)</li> <li>• Participate in community based HIV/AIDS prevention, care and support activities</li> </ul> | <ul style="list-style-type: none"> <li>○ Natural history of HIV</li> <li>○ Ways of HIV transmission</li> <li>✓ Risk and vulnerability <ul style="list-style-type: none"> <li>○ Definition of risk and Vulnerability</li> <li>○ Vulnerable and risk groups</li> <li>○ Identified risk and vulnerability factors ( HTP, Substance abuse)</li> </ul> </li> <li>✓ Common misconception on HIV/AIDS <ul style="list-style-type: none"> <li>○ Common origins of misconceptions</li> <li>○ Correcting common misconception on HIV/AIDS</li> </ul> </li> <li>✓ Prevention methods <ul style="list-style-type: none"> <li>❖ Primary prevention <ul style="list-style-type: none"> <li>○ ABC/ Dual protection /Consistent and correct usage of Condom</li> <li>○ Screening Blood Transfusion</li> <li>○ PMTCT</li> <li>○ Safer sex practice</li> </ul> </li> <li>❖ Secondary prevention( Positive prevention)(ART)</li> <li>❖ Tertiary prevention(Psycho-Social Support)</li> </ul> </li> <li>✓ Stigma and discrimination <ul style="list-style-type: none"> <li>○ Definition of stigma and discrimination</li> <li>○ Common causes</li> <li>○ Consequences</li> </ul> </li> <li>✓ HIV Counseling and Testing <ul style="list-style-type: none"> <li>○ Advantage of counseling and testing</li> <li>○ Key points while counseling for HIV</li> </ul> </li> <li>✓ Treatment Care and support <ul style="list-style-type: none"> <li>○ Treatment option (ART, PMTCT)</li> <li>○ Basic care and support for PLHIV</li> </ul> </li> <li>✓ HIV/AIDS and peoples with special needs/disability <ul style="list-style-type: none"> <li>○ Introduction to people with special needs</li> <li>○ Why to deal HIV/AIDS in people with special needs</li> <li>○ Special Interventions</li> </ul> </li> <li>✓ Intervention at community setting <ul style="list-style-type: none"> <li>○ Basic intervention of HIV/AIDS at community level Voluntarism</li> </ul> </li> </ul> | Practical Activities and/or field visits | <b>Teachers)</b>  |
| <b>CHAPTER TWO:</b>   | <b>Contents</b>  | <b>Methods</b>                           | <b>Assessment</b> |

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| <p><b>Sexual and Reproductive Health</b></p> <p><b>OBJECTIVE</b></p> <p><b>At the end of this chapter students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Identify common SRH problems and their manifestations.</li> <li>• Enumerate various contraceptive options in family planning.</li> <li>• Describe the relationship between gender and common SRH problems.</li> <li>• List common SRH Problems.</li> <li>• Develop the skills to prevent sexual and reproductive health problems,</li> <li>• Show commitment to curb HIV/AIDS</li> </ul> | <ul style="list-style-type: none"> <li>❖ Definition of concepts related to SRH <ul style="list-style-type: none"> <li>• Reproductive health</li> <li>• Sexual health</li> </ul> </li> <li>❖ Basic anatomy and physiology of reproductive organs <ul style="list-style-type: none"> <li>• Male reproductive organ</li> <li>• Female reproductive organ</li> <li>• Puberty (sexual maturation)</li> </ul> </li> <li>✓ SR Health Rights <ul style="list-style-type: none"> <li>▪ List of SRH rights</li> </ul> </li> <li>✓ <b>Common SRH problems and Misconceptions</b></li> <li>✓ <b>Sexually Transmitted Infections</b> <ul style="list-style-type: none"> <li>○ Definition STI and its Magnitude</li> <li>○ Types and common symptoms</li> <li>○ Mode of transmission</li> <li>○ Prevention</li> <li>○ Importance of early diagnosis, treatment and partner notification</li> <li>○ Complications of untreated STIs</li> </ul> </li> <li>✓ <b>Unwanted and/or unintended pregnancy</b> <ul style="list-style-type: none"> <li>○ Definition</li> <li>○ Causes(Substance abuse, early sexual debut, rape, HTP, etc)</li> <li>○ Magnitude</li> <li>○ Prevention</li> <li>○ Consequences</li> </ul> </li> <li>✓ <b>Abortion</b> <ul style="list-style-type: none"> <li>○ Definition</li> <li>○ Types (Safe and Unsafe</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>✓ Brainstorming</li> <li>✓ PBL</li> <li>✓ Case Study</li> <li>✓ Role play</li> <li>✓ Discussion</li> <li>✓ Demonstration</li> <li>✓ Practical Activities and/or field visits</li> <li>✓ Fish bowl technique</li> </ul> |  |
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|   | <p>abortion)\</p> <ul style="list-style-type: none"> <li>○ Magnitude</li> <li>○ Causes</li> <li>○ Consequences of unsafe abortion</li> <li>○ Prevention</li> </ul> <p>✓ <b>Components of SRH services</b></p> <ul style="list-style-type: none"> <li>○ Family Planning</li> </ul> <p>✓ Youth Friendly Services(YFS)</p>   |   |   |  |
| <p><b>Chapter 3: GENDER AND GBV</b></p> <p><b>OBJECTIVE</b></p> <p>At the end of this chapter students will be able to:</p> <ul style="list-style-type: none"> <li>• Define gender and related terminologies</li> <li>• Describe gender equality and equity</li> <li>• Explain gender roles and gender Needs</li> <li>• Gender based discrimination</li> <li>• Identify the causes and Impacts of gender based violence</li> <li>• Analyze gender practices in Ethiopia</li> <li>• Link among SRH, GBV and HIV</li> </ul> | <p><b>Introduction</b></p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Gender Vs. Sex</li> <li>• Gender and SRH</li> <li>• Gender role</li> <li>• Gender needs</li> <li>• Gender equity and equality</li> </ul> <p><b>Gender based violence</b></p> <ul style="list-style-type: none"> <li>• Definition of GBV</li> <li>• Types of GBV</li> <li>• Causes of GBV</li> <li>• Consequences of GBV</li> </ul> <p><b>Gender Issues in Ethiopia</b></p> <ul style="list-style-type: none"> <li>○ Gender related problems in Ethiopia</li> <li>○ Status of Ethiopian Women</li> </ul> <ul style="list-style-type: none"> <li>• <b>Interventions of GBV</b> <ul style="list-style-type: none"> <li>➤ medical measures,</li> <li>➤ psycho/social measures,</li> <li>➤ legal measures and</li> <li>➤ Empowerment.</li> </ul> </li> </ul> | <p>✓ Brainstorming</p> <p>✓ PBL</p> <p>✓ Case Study</p> <p>✓ Role play</p> <p>✓ Discussion</p> <p>✓ Demonstration</p> <p>✓ Practical activities and/or field visits</p> | <p>✓ Tests</p> <p>✓ Assignment</p> <p>✓ Mid and final exam</p> <p>✓ Class attendance and activity</p> <p>✓ Project work with presentation</p> |  |
| <p><b>Chapter 4: LIFE</b></p>   | <p><b>LIFE SKILLS</b></p> <p>✓ <b>Definition</b></p> <p>✓ <b>Significance of life skills to combat HIV/AIDS and other SRH</b></p>   | <p>✓ Brain storming</p> <p>✓ Lecture</p> <p>✓ Demonstration and</p>   |   |  |

| SKILLS   | problems   | re-demonstration  |  |  |
|--|--|---|--|--|
| <p><b>Course Objectives/Outcomes</b></p> <p>After successful completion of this chapter, students will be able to:</p> <ul style="list-style-type: none"> <li>✓ Define the concept of life skills,</li> <li>✓ Mention purposes of life Skills,</li> <li>✓ List major components of Life skills</li> <li>✓ Exhibit assertiveness and other coping life skills</li> <li>✓ Display effective communication</li> <li>✓ Apply core life skill strategies at right time in life,</li> <li>✓ Describe the concept of Counseling</li> <li>✓ Discuss procedure of Counseling</li> <li>✓ Discuss techniques of counseling</li> </ul> | <ul style="list-style-type: none"> <li>✓ Major components of life skill</li> <li>✓ Knowing and Living with one               <ul style="list-style-type: none"> <li>○ The self</li> <li>○ Self-esteem</li> <li>○ Self-awareness</li> <li>○ Self confidence</li> <li>○ Self-Concept</li> <li>○ Goal setting</li> <li>○ Academic Skill</li> <li>○ Critical thinking skill</li> </ul> </li> <li>✓ <b>Knowing and living with others</b> <ul style="list-style-type: none"> <li>○ Problem solving</li> <li>○ Decision making skill</li> <li>○ Communication skill</li> <li>○ Assertiveness Skill</li> <li>○ Negotiation skill</li> <li>○ Resisting peer pressure skill</li> </ul> </li> <li>✓ <b>Emotional Intelligence</b> <ul style="list-style-type: none"> <li>• anger management skill</li> <li>• impulse Management</li> <li>• delaying gratification</li> <li>• Rational Thinking</li> <li>• empathy</li> </ul> </li> <li>✓ Definition of Counseling</li> <li>✓ Importance of Counseling</li> <li>✓ Procedures of Counseling</li> <li>✓ Techniques of Counseling</li> </ul> | <ul style="list-style-type: none"> <li>✓ Role play</li> <li>✓ Group Discussion</li> </ul> | <ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Assignments</li> <li>• Final Exam</li> </ul> |  |
| <b>Grading System</b>  | As per the harmonized Curriculum and respective Universities Senate Legislation  |   |  |  |

## **Module 07: Introductory Pharmacy Module**

**Module Name:** Introductory Pharmacy Module

**Module Category:** Core

**Module Code:** Phar-M2071

**Module Number:** 07

**Credit Weight:** 4 EtCTS

**Courses:** Introduction to Pharmacy (Phar2071)

Pharmaceutical Calculation (Phar2072)

### **Module Description**

The module covers evolution and scope of pharmacy; pharmaceutical terminologies; and pharmacist role in the health care delivery. The module also introduces students with some fundamentals of measurement and calculations, calculation of doses and formulas, dilution and concentration and isotonic, buffer and electrolyte solutions. The field study will also provide an opportunity to the student to have practical exposure to the various pharmacy settings.

### **Module Objective**

The aim of the module is to introduce the students with the pharmacy profession and its evolutionary development in the context of both the local and the global sense and to familiarize students with basic calculations related with pharmacy practices.

### **Module Competency**

Upon a successful completion of this module, students will be able to calculate doses for different groups of patients, quantify the ingredients required in dosage forms preparation & dispensing, prepare different strength of solutions and interpret prescriptions.

### **Module Mode of Delivery**

- Parallel

### **Module Learning Teaching Methods**

- Active participation during class lectures and excursions
- Engage in learning by doing
- The course instructor is expected to introduce concepts and topics and give references, facilitate discussions, ask questions, correct assignments
- Arrange and facilitate excursions

### **Time Allocation**

- Total time: 108hrs

- Lecture hours: 32 hrs
- Tutorial: 6 hrs
- Home study: 47 hrs
- Visits to various pharmacy settings: 15 hrs
- Assessment: 8 hrs

### **Module Assessment Techniques**

- Quizzes
- Report writing
- Assignments
- Seminar presentation
- Final exam

## **Introductory Pharmacy Module Course Syllabi**

**Module Number:** 07

**Course Title:** Introduction to Pharmacy

**Course Code:** Phar2071

**Course EtCTS:** 2

**Course hrs:** 54hrs

### **Course Description:**

The theoretical aspect of the course covers scope of pharmacy; evolution of pharmacy; pharmaceutical terminologies; and pharmacist role in the health care delivery. The field study provides an opportunity to the student to have practical exposure to the various pharmacy settings.

### **Course Objectives**

This course aims to introduce the student at the entry-point to the profession of pharmacy.

### **Course Contents**

1. General background (6hrs)
  - 1.1. Introduction to the healthcare system in Ethiopia
  - 1.2. Scope of pharmacy: education and careers
  - 1.3. Evolution of pharmacy (pre-historic pharmacy, antiquity, the middle ages, renaissance, discoveries and background of modern pharmacy)

- 1.4. History of drugs and dosage forms
- 1.5. Pharmacy in Ethiopia: development, types of pharmacy settings
- 2. Commonly used pharmaceutical and medical terminologies (2hrs)
  - 2.1. Latin terms and abbreviations, types of dispensed pharmaceutical preparations
- 3. Introduction to pharmacy practices (4 hrs)
  - 3.1. Community pharmacy
  - 3.2. Hospital pharmacy
  - 3.3. Pharmacists in industry
  - 3.4. Pharmacists in government (regulatory body) and other areas (academic, research, etc.)
- 4. Pharmacist role in the health care delivery (1hr)

### **Mode of Delivery**

- Illustrated lecture
- Individual and group exercises and assignments presentation
- Visits to various pharmacy settings (15 hrs: 3 hrs x 5 weeks)

### **Assessment:**

- Tests: 15
- Quizzes: 10%
- Presentation: 10%
- Assignments: 10%
- Report writing: 15%
- Final exam: 40%

### **Course Policies:**

- Students are expected to have 100% attendance and to read all reading assignments in advance
- Student should submit all group and/or individual assignments on due date
- Student should take all continuous assessments as scheduled.

## ***References***

1. Remington's Pharmaceutical Science, 21<sup>st</sup> ed., Lippincott Williams & Wilkins, Pennsylvania, 2006.
2. Stone, P. and Curtis, S. J., Pharmacy Practice, 2<sup>nd</sup> ed., Farrand Press, London, 1995.
3. Sonnedecker, G., Kremer and Urdag's History of Pharmacy, Lippincott, Philadelphia, 1976.
4. Winfield, A. J. and Richards, R. M. E. (eds.), Pharmaceutical Practice, 2nd ed., Churchill Livingstone, London, 1998.
5. Carter, S. J., (edr.) Cooper and Gunn's Dispensing for Pharmaceutical Students 12<sup>th</sup> ed. Pitman Medical Publishing Co. Ltd., London, 1975.
6. Dittert, L. W., (ed.) Sprowl's American Pharmacy, 7<sup>th</sup> ed., J. B. Lippincott Co. Philadelphia, 1974.
7. Michael L. P., Pharmacy, An Introduction to the Profession, The American Pharmacists Association, Washington DC, 2003.
8. Whalley, B. J., Fletcher K.E., Weston S.E., Howard R.L. and Rawlinson C.F., Foundation in Pharmacy Practice, Pharmaceutical Press, London, 2008.
9. Wiedenmayer K., Summers R.S., Mackie C.A., Gous A.G.S., Everard M. and Tromp D. Developing pharmacy practice, WHO/IPF, 2006.



**Module Number:** 07

**Course Title:** Pharmaceutical Calculations

**Course Code:** Phar2072

**Course EtCTS:** 2

**Course hrs:** 54hrs

**Course Description:**

This course is designed to familiarize students with the basic calculations related with pharmacy practices. The course introduces students with some fundamentals of measurement and calculations, calculation of doses and formulas, dilution and concentration and isotonic, buffer and electrolyte solutions

**Course Objective:**

After completion of this course students will be able to:

- Understand the basic concepts about balance sensitivity, significant figures, accuracy and percentage of errors, measurement of volume and weight, aliquot method of weighing and measuring, density, specific gravity, specific volume which are important in pharmacy practices.
- Understand the basic calculations in percentage preparations, dosage conversions, formula reduction and enlargement
- Understand the basic calculations of dilution and concentration
- Understand the basic calculations in isotonic, buffer and electrolyte solutions
- Understand the basic calculations involving parenteral admixtures and radiopharmaceuticals

**Course Contents**

1. Some fundamentals of measurement and calculations (2hrs)

- 1.1. Balance sensitivity, significant figures, accuracy and percentage of errors
- 1.2. Measurement of volume and weight
- 1.3. Aliquot method of weighing and measuring
- 1.4. Density, specific gravity, specific volume

2. Percentage calculations (2hrs)
  - 2.1. Percentage, ratio and proportion
  - 2.2. Percentage preparations (percentage W/V, V/V, W/W)
  - 2.3. Conversions of concentration to mg/mL, Parts per million (ppm)
3. Calculation of doses and formulas (2hrs)
  - 3.1. Calibration of Droppers
  - 3.2. Calculations of doses (dose size, number of doses, amount dispensed, quantity of ingredient)
  - 3.3. Drug Dosage based on Age (pediatrics and geriatrics)
  - 3.4. Drug Dosage based on Body Weight
  - 3.5. Drug Dosage based on Body Surface Area
  - 3.6. Enlarging and reducing formulas
4. Dilution and concentration (4hrs)
  - 4.1. Strength and total quantity
  - 4.2. Dilution and Concentration of liquids
  - 4.3. Dilution and Concentration of solids
  - 4.4. Triturations
  - 4.5. Alligation medial and Alligation Alternate
  - 4.6. Specific gravity of Mixture
5. Isotonic, buffer and electrolyte solutions (3hrs)
  - 5.1. Calculation for Isotonic Solution preparation
  - 5.2. Sodium Chloride equivalent of a substance
  - 5.3. Isotonicity, osmolarity, milliequivalents, milliosmoles
  - 5.4. Buffers and buffer solutions
  - 5.5. Buffer equation
  - 5.6. Isotonic buffer solutions
6. Some calculations involving parenteral admixtures (2hrs)

Dry powders for reconstitution, parenteral admixtures, additives, hyperalimentation solutions, rate of flow of IV fluids
7. Some calculations involving radiopharmaceuticals (1hrs)

## Radioisotopes, radioactivity, units of radioactivity

### Mode of Delivery

- Lecture: 12hrs
- Assignment: 8 hrs
- Home study: 24hrs
- Tutorial: 6hrs
- Quizzes: 30 Minutes (10 minutes per each quiz)
- Tests: 90 minutes (30 minutes per each test)
- Final exam: 2 Hrs

### Mode of Assessment:

- Assignments: 15%
- Tests: 30%
- Quizzes: 15%
- Final exam: 40%

### Course Policies:

- Students are expected to have 100% attendance and to read all reading assignments in advance
- Student should submit all group and/or individual assignments on due date
- Student should take all continuous assessments as scheduled.

### References

1. Stoklosa, M. J. and Ansel, H. C. Pharmaceutical calculations, 8<sup>th</sup> ed., Lea & Febiger, Philadelphia, 1986
2. Joel L. Zatz and M. G. Teixeira. Pharmaceutical calculations, 4<sup>th</sup> ed., John Wiley & Sons, Inc., New Jersey, 2005.

## **Module 8: Pharmacognosy and Alternative Medicine module**

**Module Name:** Pharmacognosy and Alternative Medicine module

**Module Category:** Core

**Module weight in EtCTS:** 15 EtCTS

**Module Code:** Phar-M2081

**Module number:** 08

**Courses & Course codes:**

- Chemistry of Natural Products (phar2081) (5 ECTS)
- Pharmacognosy (phar2082) (7 ECTS)
- Complementary and Alternative Medicine (phar2083) (3 ECTS)

### **Module description:**

The module studies about medicines derived from natural source; and natural substances and their chemistry. It is designed in such a way that the trainee gets well acquainted with the study of the physical, chemical, biochemical and biological properties of drugs, drug substances, or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources, various alternative and complementary medicine practices including the Ethiopian traditional medicine. It also deals with chemical structure, chemical reactions and synthesis of natural products

**Module Objective:** At the end of this module students will understand and demonstrate the source, chemical & biological nature of drugs and drug substances of natural origin; & explain different forms of complementary & alternative medicines

### **Module Competencies:**

- Define and describe natural sources of drugs and drug substances
- Explain the physical, chemical, biochemical and biological properties of drugs or drug substances of natural origin
- Associate pharmaceutical application of natural products and related services
- Devise research protocols on drug discovery from natural products
- Describe & compare the role of various forms of complementary & alternative medicines in primary health care service.
- Demonstrate procedures of obtaining drug/drug substance from natural sources
- Perform physical, chemical & biological characterization of natural products
- Display & perform regulatory & quality control activities on natural products
- Display rational usage of natural products (as drugs, foods, alternative medicines)
- Comply laboratory safety precautions and standards
- Assist research activities related to drug discoveries from natural products
- Follow scientific protocols to perform and report experimental works
- Ready to provide service that ensure rational usage of natural products

## **Learning Activities and Teaching Methods**

### **A. Learning Activities:**

- Attend lectures and demonstrations, take notes, and ask questions....
- Engage in learning by doing (independent study, group assignments, presentation, report writing, and etc...)
- Participation and discussions;
- Practical laboratory works including sample preparation, Extraction, interpretation and report writing

### **B. Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments, guide practical sessions, correct and give feedbacks of reports of practical sessions.
- Arrange and facilitate seminar sessions, discussions and give comments and feedbacks.
- Field visit and visiting traditional practitioners

## **Roles of Instructors and Students**

### **A. Roles of Instructors-**The instructor will be expected to:

- Be a facilitator (introduce the subject; give guidance, moderate discussions, etc.)
- Read and comment assignments of students on time;
- Prepare his/her lessons and deliver lectures;
- Provide available and necessary reference materials.
- Encourage active participation of students in the teaching learning process;
- Assist students with learning difficulties;
- Arrange and follow up practical sessions

### **B. Roles of Students-**Students are expected to:

- Engage in learning by doing (independent study, project work; group work, etc.)
- Be active learners (participate effectively in laboratory activities, in group assignments, make presentations, write reports, etc.);

## **Mode of Module Delivery-time share for each activity**

- Total study hour: 405Hrs
- Illustrated Lecture: 128 hours
- Practical sessions: 36 hours
- Tutorial: 30 hours
- Seminars, assignments and presentation: 40 hours
- Assessment (continuous & final): 24 hours
- Independent study (alone or in groups): 147 hours

## **Mode of assessment:**

- |                            |                     |
|----------------------------|---------------------|
| • Seminars and assignments | • Practical exam    |
| • Quizzes                  | • Laboratory report |

- Laboratory written exam
- Final exam

### Pharmacognosy and Alternative Medicine module syllabi

|                                  |   |
|----------------------------------|---|
| <b>Module Number</b>             | <b>08</b>   |
| <b>Course Title</b>              | <b>Chemistry of Natural Products</b>  |
| <b>Course Code</b>               | Phar2081  |
| <b>Course EtCTS (Course hrs)</b> | 5 (135hr)   |
| <b>Course Category</b>           | Major Course  |
| <b>Pre-requisite</b>             | Fundamentals of Organic Chemistry, Practical Organic Chemistry  |
| <b>Co-requisite</b>              | None  |
| <b>Course Description</b>        | The course covers some selected topics in natural products chemistry. The goal is to acquaint students to the basic evidences, which are results of observations carried out over generations that are in use to chemically characterize natural products of primary and secondary metabolism. It also realizes that the same reactions organic chemists know so well are apparently only mimics of what occurs naturally.  |
| <b>Course Objectives</b>         | By the end of this course students will be able to describe the chemical structure, chemical reactions, some chemical classes and related properties of natural products as well as their applicability.  |
| <b>Supportive objectives</b>     | By the end of this course the trainee will be able to: <ul style="list-style-type: none"> <li>▪ Describe the chemical structure, chemical reactions and synthesis of natural products.</li> <li>▪ understand the field of natural products chemistry</li> <li>▪ describe the chemical structure, chemical reactions and synthesis of natural products</li> <li>▪ identify natural products and their probable biosynthetic pathways</li> <li>▪ describe the different classes of natural products</li> <li>▪ enhance their understanding of biochemical and pharmacological sciences</li> </ul> |

### Course Content

|   |        |
|---|--------|
| 1. Stereochemistry .....  | 4 hrs  |
| ▪ Isomerism, conformation and configuration, chirality, enantiomers, optical activity, diastereomers, racemic mixtures, meso-compounds  |        |
| 2. Carbohydrates .....  | 10 hrs |
| ▪ Introduction, classification, reactions and configuration of carbohydrates, cyclic structures of monosaccharides, conformation of monosaccharides, chemistry of disaccharides and polysaccharides |        |

|  |        |
|--|--------|
| 3. Lipids .....  | 4 hrs  |
| ▪ Definition, occurrence and composition of fats, oils and waxes; Reactions of fats and oils; Determination of analytical values for fats and oils   |        |
| 4. Amino acids and proteins .....  | 10 hrs |
| ▪ Structure, nomenclature, physical and chemical properties of amino acids, structure and nomenclature of peptides, classification and properties of proteins, synthesis of peptides   |        |
| 5. Steroids .....  |        |
| ▪ Introduction, sources for steroids, significance of steroids in pharmacy, chemistry and nomenclature of steroids, sterols  | 4 hrs  |
| 6. Terpenes .....  |        |
| ▪ Introduction, properties and isolation of terpenoids, Isoprene rule, Classification of terpenoids, Significance of terpenoids in pharmacy  |        |
| 7. Purines and nucleic acids .....   | 4 hrs  |
| ▪ Introduction, Uric acid, Purine derivatives (adenine, xanthine, hypoxanthine, and guanine), Xanthine bases (theophylline, theobromine and caffeine), Introduction to and structure of nucleic acid   |        |
| 8. Heterocyclic compounds .....  |        |
| ▪ Introduction, Classification and nomenclature, physical and chemical properties, Significance of some heterocyclic compounds in pharmacy (furan, pyrrole, thiophene, pyrazole, imidazole, pyridine, pyrimidine, oxazole, isoxazole, and phenothiazine) | 4 hrs  |

**Total** **48 hrs**

**Mode of Delivery**

- Illustrated Lecture: 48 hours
- Tutorial: 8 hours
- Individual presentation, group discussions, audiovisuals, seminars, and assignments: 10 hours
- Assessment (continuous & final): 8 hours
- Independent study (alone or in groups): 61 hours

**Mode of Assessment**

- Seminars and assignments..... 20%
- Quizzes..... 30%
- Final exam..... 50%

**Reference Books**

1. Morrison, R.I. and Boyd, R.N. *Organic chemistry, 5th ed. Prentice-Hall of India, New Delhi, 1989*
2. Robert Boxer. 1997. *Essentials of organic chemistry; the McGraw-Hill companies, Inc*
3. Finar I.L. *Organic chemistry, Vol I and II, 6<sup>th</sup> ed. Longman, 1985*

|  |                                      |
|--|--------------------------------------|
| <b>Module Number</b>                   | <b>08</b>                            |
| <b>Course Title</b>                    | <b>Pharmacognosy</b>                 |
| <b>Course Code</b>                     | <b>Phar 2082</b>                     |
| <b>Course EtCTS<br/>(Course hours)</b> | <b>7 (189 hours)</b>                 |
| <b>Course Category</b>                 | <b>Major Course</b>                  |
| <b>Pre-requisite</b>                   | <b>Chemistry of Natural Products</b> |
| <b>Co-requisite</b>                    | <b>None</b>                          |

**Course Description** The course is designed in such a way that the trainee gets well acquainted with the study of the physical, chemical, biochemical and biological properties of drugs, drug substances, or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources. The course familiarizes trainees with the basic scientific knowledge and skill needed to obtain and characterize active substances from natural sources. It also helps trainees to understand and realize the fact that nature provides the origin and continuous supply of drugs or drug substances, and think about the proper management and utilization of such natural products.

**Course Objective** To familiar students with the general aspects of crude drugs, extraction and isolation methods and the distribution, properties and uses of various primary and secondary metabolites of plant, animal and mineral origin.

- Supporting objectives**
- Develop skill to extract, identify and evaluate compounds from natural sources.
  - Provide services related to extraction, isolation and evaluation of natural products in addition to advising the patient about drug-herb interactions.

#### Course Content

1. General Introduction ..... 7 hrs
  - 1.1. Definition, History and scope of Pharmacognosy (1 hr)
  - 1.2. Crude drugs (4 hrs)
    - 1.2.1. Definition and Nomenclature of crude drugs
    - 1.2.2. Classification of crude drugs
    - 1.2.3. Evaluation of crude drugs
    - 1.2.4. Types of preparations from plants
    - 1.2.5. Schemes for pharmacognostic studies of crude drugs.
    - 1.2.6. Official and Unofficial drugs



- 1.3. Steps in the scientific analysis of drugs from natural resources (2 hr)
  - 1.3.1. Selection of plant material
  - 1.3.2. Taxonomic identification of the plant
  - 1.3.3. Literature survey on the identified plant
  - 1.3.4. Design of appropriate extraction and separation methods
  - 1.3.5. Checking extracts/ fractions for pharmacological activity
  - 1.3.6. Identification of classes of compounds found in the plant (phytochemical screening)
  - 1.3.7. Isolation of active compounds or fractions responsible for the pharmacological activity of the plant
2. General methods in studying constituents of crude drugs .....
  - 2.1. Extraction (3 hrs)
    - 2.1.1. Definition and the need for extraction
    - 2.1.2. Preparation of plant material for solvent extraction
    - 2.1.3. Choice of suitable solvents
    - 2.1.4. Methods of extraction
  - 2.2. Factors affecting crude drug quality (1hrs)
  - 2.3. Isolation and purification of active constituents (4hrs)
    - 2.3.1. Classical methods of separation
    - 2.3.2. Modern methods/chromatographic methods
  - 2.4. Primary and secondary plant metabolites (1hr)
3. Major plant constituents and their botanical sources ..... 9 hrs
  - 3.1. Carbohydrates (2 hrs)
    - 3.1.1. Sugars and sugar containing drugs
    - 3.1.2. Compounds related to sugars
    - 3.1.3. Polysaccharides
    - 3.1.4. Gums and mucillages
  - 3.2. Glycosides (6 hrs)
    - 3.2.1. General properties of glycosides
    - 3.2.2. Classification of glycosides
    - 3.2.3. Classes of glycosides: Anthraquinones, Saponins, Cardiac glycosides, Simple phenolic glycosides, Flavonoid glycosides, Isothiocyanate glycosides, Cyanogenetic glycosides, Coumarin glycosides
  - 3.3. Tannins (2 hrs)
    - 3.3.1. General properties and Chemistry
    - 3.3.2. Classification: Hydrolysable, Nonhydrolysable (condensed), Pseudotannins
    - 3.3.3. Significance of tannins
  - 3.4. Lipids and waxes (2 hrs)
    - 3.4.1. Lipids: Physical and chemical properties, Extraction methods

- 3.4.2. Official fixed oils/fats and their composition 30 hrs  
Arachis oil, castor oil, almond oil, sesame oil, theobroma oil, codeliver oil etc
- 3.4.3. Waxes: Definition and general properties, Animal waxes, Vegetable waxes
- 3.5. Volatile oils (5 hrs)
- 3.5.1. Distribution and occurrence, Uses, Methods of preparation (Distillation, Expression, Extraction with solvent, enzymatic hydrolysis), Physical properties, Chemistry, Biosynthesis
- 3.5.2. Constituents of volatile oils: Hydrocarbons, Alcohols, Aldehydes, Ketones, Esters, Phenols and phenolic ethers Oxides Peroxides Sulfur containing compounds Nitrogen containing compounds
- 3.6. Resins and Resin Combinations (3 hrs)
- 3.6.1. General properties and chemistry
- 3.6.2. Examples of drugs containing resins: Rosin, Podophyllin, Jalap, Mastic, Cannabis (Preparation, Constituents, Factors affecting the narcotic activity, Legal aspects, Analysis), Oleoresins Oleo-gum resins, Balsams
- 3.7. Alkaloids (8 hrs)
- 3.7.1. Definition, Nomenclature, Occurrence, Physical and chemical properties, Detection, Extraction and isolation
- 3.7.2. Classification
- 3.7.3. Classes of alkaloids
- 3.7.3.1. Ornithine derived alkaloids: Tropane alkaloids Solanaceae alkaloids, Coca alkaloids, Pyrolizidine alkaloids
- 3.7.3.2. Lysine derived alkaloids: Lobelia alkaloids, Lupine alkaloids
- 3.7.3.3. Nicotinic acid derived alkaloids: Ricinine, Areca alkaloids, Tobacco alkaloids
- 3.7.3.4. Tyrosine derived alkaloids: (1) Simple phenylethylamines and tetrahydroisoquinolines: Mescaline, Ephedrine, Alkaloids of 'Khat'; (2) Colchicine; (3) Papaver alkaloids: Phenanthrene group, Benzyloisoquinoline group; (4) Emetine and related alkaloids; (5) Tubocurarine
- 3.7.3.5. Tryptophan derived alkaloids: Simple indoles, Tricyclic alkaloids: Pegamum alkaloids, Physostigma alkaloids, Ergot alkaloids (Historical background, Life cycle of ergot, Commercial production, Chemistry and occurrence, Biosynthesis and use, LSD), Rauwolfia alkaloids, Strychnos alkaloids, Cinchona alkaloids, Periwinkle alkaloids
- 3.7.3.6. Histidine derived alkaloids: Pilocarpine
- 3.7.3.7. Polyacetate derived alkaloids: Hemlock alkaloids

|  |  |               |
|--|--|---------------|
| 3.7.3.8. Psedoalkaloids: Steroidal alkaloids: Veratrum alkaloids, Solanum alkaloids, Holarrhena alkaloids, Buxus alkaloids, Purine alkaloids |  | 2 hrs         |
| 4. Selected topics .....   | • Cytotoxic and carcinogenic compounds of plant origin   |               |
| <b>Total</b>   |  | <b>48 hrs</b> |
| <b>Mode of Delivery</b>  | <ul style="list-style-type: none"> <li>• Illustrated Lecture: 48 hours</li> <li>• Practical sessions: 36 hours</li> <li>• Tutorial: 12 hours</li> <li>• Seminars, assignments and presentation: 16 hours</li> <li>• Assessment (continuous &amp; final): 10 hours</li> <li>• Independent study (alone or in groups): 67 hours</li> </ul>   |               |
| <b>Mode of Assessment</b>  | <ul style="list-style-type: none"> <li>• Seminar/Assignments/ quizzes: 25%</li> <li>• Laboratory written exam: 15%</li> <li>• Practical exam: 10%</li> <li>• Final Exam: 50%</li> </ul>  |               |
| <b>Text Book</b>   | Trease, G.E. and Evans, W.C. Pharmacognosy, 15 <sup>th</sup> ed. Bailliere Tindall, London, 2002.  |               |
| <b>Reference Books</b>   | <ol style="list-style-type: none"> <li>1. Tyler, V.E., Brady, L.R. and Robbers, J.E. Pharmacognosy, 8th ed. Lea &amp; Febiger, Philadelphia, 1981</li> <li>2. Brunetone, J. Pharmacognosy, phytochemistry Medicinal plants, 2nd ed. Lavoisier publishing, Paris, 1999</li> <li>3. Pulok K. Mukherejee. Quality control of herbal drugs; an approach to evaluation of botanicals. Business Horizons pharmaceutical publishers 2002</li> </ol> |               |

|   |   |
|---|---|
| <b>Module number</b>  | <b>08</b>   |
| <b>Course Title</b>   | <b>Complementary and Alternative Medicine</b>   |
| <b>Course Code</b>  | <b>Phar 2083</b>  |
| <b>Course EtCTS (Course hrs)</b>  | <b>3 (81 hours)</b>   |
| <b>Pre-requisite</b>  | <b>Pharmacognosy</b>  |
| <b>Co-requisite</b>   | <b>None</b>   |
| <b>Course Rationale</b>   | Complementary and Alternative Medicine has significant role in health care provision and indeed, some diseases are believed to be better managed by this medication system  |
| <b>Course Description</b>   | The course is designed in such a way that the trainee gets well acquainted with the various alternative and complementary medicine practices including the Ethiopian traditional medicine. In addition, the trainee will be able to understand and make use of complementary medicine in primary health care. |
| <b>Course Objectives</b>  | By the end of this course the trainee is expected to be familiar with the forms of complementary medicine and also to be well oriented about the use of complementary medicine in primary health care.  |
| Course content  |   |
| 1. Introduction .....   | 2 hrs   |
| 1.1. Definition of Terms  |   |
| - Traditional medicine, Ethnomedicine, Allopathy, CAM etc.                    |   |
| 1.2. Traditional Medicine Vs modern medicine                                  |   |
| 2. Ethiopian Traditional Medicine .....                                       |   |
| 2.1. Historical background of Ethiopian Traditional Medicine                  | 4 hrs   |
| 2.2. Principles   |   |
| 2.3. Methods of practice and practices  |   |
| 2.4. Documentation  |   |
| 2.5. Clinical trials/ scientific investigations                               |   |
| 3. African Traditional Medicine .....   | 3 hrs   |
| 3.1. Historical development of African Traditional Medicine                   |   |
| 3.2. Principles   |   |
| 3.3. Methods and areas of practice  |   |
| 3.4. Practitioners  |   |
| 3.5. Documentation  |   |
| 3.6. Clinical trials  | 4 hrs   |
| 4. Some popular complementary medical practices .....                         |   |
| 4.1. Medical Herbalism (4hrs)   |   |
| Herbal Medicine, Herbs as therapeutic agents, Various ways of preparing herbs |   |

as therapeutics in traditional medicine, Areas of practice, Significant herbs used in CAM

4.2. Aromatherapy (2hr)

Definition, Historical background, Principles and laws of cure, Areas of practice, Methods and materials used in the healing process

4.3. Homeopathy (4hrs)

Definition, Historical background, Principles and laws of cure, Areas of practice, Methods and materials used in the healing process, Practitioners, Clinical trials/current scientific investigations

4.4. Traditional Chinese Medicine (4hrs)

Definition, Historical development, Principles, Examples of Chinese Traditional Medicine, Acupuncture, Herbal Medicine in China

4.5. Traditional Indian Medicine (4hrs)

Definition, Historical development, Examples of Indian Complementary Medicine,

4.5.1. Ayurveda

Principles of Ayurvedic medicine, Methods and materials used, Areas of practice, Clinical trials, Current scientific investigations

4.5.2. Unani

Principles of Unani, Methods and materials used in the healing process, Areas of practice, Scientific investigations,

4.6. Oriental Medicine (1hr)

Definition of terms and introduction, Historical development, Principles of Oriental Medicine, Methods and materials used for diagnosis/healing etc., Regions of practice, Scientific investigations

4.7. Naturopathy (2hrs)

Definition of terms and introduction, Historical development, Principles of Naturopathy, Methods and materials used for healing/diagnosis etc., Regions of practice, Scientific investigations

5. Traditional medicine and primary health care (PHC) .....

5.1. Brief overview of PHC.

5.2. Methods of using traditional medicine in PHC.

5.3. Training the practitioners.

5.4. Advantages of using traditional medicine in PHC.

2 hrs

|                           |  |
|---------------------------|--|
| <b>Total</b>              | <b>32 hrs</b>  |
| <b>Mode of Delivery</b>   | <ul style="list-style-type: none"> <li>• Illustrated Lecture: 32 hours</li> <li>• Tutorial: 8 hours</li> <li>• Seminars and assignments: 6 hours</li> <li>• Field visit and visiting traditional practitioners: 10 hours</li> <li>• Independent study hour: 25hrs</li> </ul> |
| <b>Mode of Assessment</b> | <ul style="list-style-type: none"> <li>• Seminar/Assignments: 15%</li> <li>• Quizzes: 35%</li> <li>• Final Exam: 50%</li> </ul>  |
| <b>Text Book</b>          |  |
| <b>Reference Books</b>    | <ol style="list-style-type: none"> <li>1. WHO, Traditional Medicine and Health Care Coverage, WHO, Geneva, 1983</li> <li>2. Mohammed Ali, Text Book of Pharmacognosy, 2nd ed. CBS publishers, New Delhi, 1998.</li> </ol>  |

## **Module 09: Dosage Form Sciences Module**

**Module Name:** Dosage Form Sciences Module

**Module Category:** Core

**Module Code:** Phar-M2091

**Module Number:** 09

**Module Weight:** 18 EtCTS

**Courses:**

- Integrated Physical Pharmacy and Pharmaceutics-I: phar2091 (9 ECTS)
- Integrated Physical Pharmacy and Pharmaceutics-II: phar2092 (9 ECTS)

### **Module Description**

The module deals with the science and arts of converting drugs into medicines rendering students with practical insight into drug formulation principles at the very outset. It gives students the basic sciences in physical pharmacy that play a role during large scale production and extemporaneous compounding of liquid dosage forms (solutions, emulsions and suspensions) and semisolid dosage forms (ointment, cream, paste and jelly). Moreover, this module will give students about critical issue to be considered in formulation development including micromeritics, rheology, drug release from dosage forms (diffusion and dissolution), issue of components incompatibilities, drug stability and methods to determine shelf life of different products.

### **Module Objective**

This module aims at providing the student with a broad understanding of physicochemical principles that govern the behavior of drugs, excipients and dosage forms. It also enables the student to prepare extemporaneous preparations based on the basic science knowledge she/he to gain.

### **Module Competency**

This module enables student develop the knowledge, skill and attitude required in preparing extemporaneous preparations and play a role in formulation development.

### **Mode of deliver**

- Parallel

### **Module Learning Teaching Methods**

#### **Learning activities**

Students are expected to undertake among others the following major learning activities:

- Engage in learning by doing (independent study, group assignments, presentation, report writing, and etc...)
- Participation and note takings during class lectures and debates and discussions;
- Analysis, summarization and presentations of chapter/article, scientific papers (and be able present or submit in a concise and shorten form)
- Search validated formula from standard books, journals, scientific papers; elaborate the purpose of each component of the formula; understanding the compounding procedure; prepare extemporaneous preparations and then write label to it

### **Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments,
- Arrange and facilitate seminar sessions by inviting professionals from other units/departments in the department/school and other interested staffs as well.

### **Time Allocation**

The modes of deliveries for this module are the following:

- Total hr: 486 hrs
- Lecture hours: 100 hrs
- Practical: 144 hrs
- Tutorial: 28 hrs
- Home study: 214 hrs

### **Module of Assessment:**

- Group assignments
- Presentations
- Laboratory reports
- Practical exam
- Tests/quizzes
- Final Exam

## **Dosage Form Sciences Module Course Syllabi**

**Module Number:** 09

**Course Title:** Integrated Physical Pharmacy and Pharmaceutics I

**Course Code:** Phar 2091

**Course EtCTS:** 9

**Contact hrs:** 243 hrs



**Prerequisite:** Pharmaceutical Calculations

**Co-requisite:** None

**Course Description:**

The design of the course is based on the integration of the study of physico-chemical principles of pharmacy with the formulation and preparation of pharmaceutical dosage forms. The integration is done within each main class of pharmaceutical dosage forms. The study of the physico-chemical principles of pharmacy serves as a prologue to the materials covered in each section. The main focus of this course is the application of the knowledge of the physico-chemical principles of pharmacy to the rational formulation, compounding, quality control, packaging and storage of pharmaceutical dosage forms.

**Course Objective:**

At the end of this course, the student will be able to:

- Understand the different types of dosage forms and routes of administration
- Understand the types of intermolecular interaction forces, the phase rule and phase equilibria of one, two and three component systems
- Understand the concepts surface and interfacial tensions, adsorption at liquid and solid interfaces
- Define solubility, understand different solubility expressions, the basic concepts behind gas/liquid and liquid/liquid solutions and solubility of different types of solids in liquids
- Understand the distribution law, and its applications
- Understand different types of containers, packaging materials, storage conditions and labeling requirements of pharmaceutical dosage forms
- Understand the different types of solution dosage forms and develop skills to compound them
- Define and differentiate Newtonian and Non-newtonian systems, understand thixotropic property of fluids, understand the methods of determination of viscosity and its pharmaceutical applications

- Understand sedimentation in suspensions, interfacial property of suspended particles, the electric double layer and DLVO theory
- Differentiate between flocculated and deflocculated suspensions and understand rheologic property of suspensions, preparation methods, and labeling & storage conditions
- Understand types of emulsions and methods to identify emulsion type, theories of emulsification and physical instabilities in emulsions, preservation of emulsions & rheology of emulsions
- Understand methods of extemporaneous compounding of emulsions, labeling and storage conditions

### **Course Contents:**

1. Introduction to dosage forms and routes of drug administration (3 hrs)
  - Definition, the need for dosage forms, classification, overview of dosage form design
  - Introduction to pharmaceutical ingredients (definition, importance)
  - Routes of administration
2. Phase Equilibria (6 hrs)
  - Introduction to intermolecular force of interaction
  - The phase rule
  - Phase equilibria of single, two and three component systems (principles and applications)
3. Interfacial Phenomena (8 hrs)
  - Liquid interface (surface/interfacial tension, measurement of surface/interfacial tension, surface free energy, spreading)
  - Adsorption at liquid interfaces (surfactants: basic concepts, the HLB system and applications)
  - Adsorption at solid interfaces (Solid/gas interface, solid/liquid interface, Adsorption isotherms)
4. Solubility and Distribution Phenomena (9 hrs)
  - Terminologies (solute, solvent, solution, solubility)
  - Solute-solvent interactions (polar, nonpolar and semipolar solvents)
  - Solubility expressions

- Solubility of gases in liquids
    - Factors affecting solubility of gases, Solubility calculations
  - Solubility of liquids in liquids
    - Ideal and real solutions, complete and partial miscibility, factors affecting solubility of liquids
  - Solubility of solids in liquids
    - Ideal and non ideal solubility
    - Solubility and the heat of solution
    - Solubility of strong and slightly soluble electrolytes
    - Solubility of weak electrolytes (effect of pH)
    - The influence of solvents on the solubility of drugs
    - Influence of surfactants
    - Complexation as solubility enhancing mechanism
    - Influence of solid state (polymorphs, amorphous, solvates)
  - Distribution phenomena
    - Distribution law
    - Effect of molecular association and ionic dissociation
    - Applications
5. Packaging and storage of pharmaceuticals (5 hrs)
- Introduction (definitions and terminologies)
  - Packaging materials
  - Closures
  - Labeling pharmaceutical dosage forms
  - Storage, stability of pharmaceuticals and beyond use date
6. Pharmaceutical Solutions (8 hrs)
- Introduction
  - Formulation of solutions (API and Excipients)
  - General methods of preparation
  - Solutions taken orally
  - Solutions used in the mouth and throat

- Solutions instilled into body cavities
- Topical solutions
- Injectables (sterile products)

#### 7. Rheology (7 hrs)

- Introduction
- Newtonian and Non-Newtonian systems
- Thixotropy
- Determination of viscosity
- Pharmaceutical applications of rheology

#### 8. Colloids (5 hrs)

- Introduction (definition, classification and applications)
- Optical properties of colloids
- Kinetic properties of colloids
- Electrical properties of colloids

#### 9. Pharmaceutical Suspensions (7 hrs)

- Introduction
- Desirable properties
- Sedimentation in suspensions
- Interfacial properties of suspended particles
- Electrical properties of suspended particles (EDL and DLVO theory)
- Flocculated/deflocculated suspensions (properties and evaluations)
- Formulation approaches (structure vehicle, controlled flocculation and combination)
- Rheology of suspension
- Preparation of suspensions (diffusible, indiffusible, poorly wettable solids)
- Label and storage

#### 10. Pharmaceutical Emulsions (6 hrs)

- Introduction
- Determination of emulsion type
- Theories of emulsification (surface free energy, mechanisms of stabilization by emulsifying agents)

- Physical instabilities (creaming, flocculation, cracking, phase inversion)
- Preservation of emulsion
- Rheology of emulsion
- Preparation of emulsion
- Labelling and storage

### ***Teaching Methods:***

- Illustrated lectures
- Individual and group exercises and assignments
- Tutorials and review exercises
- Demonstrations, laboratory exercises and presentations

### **Mode of Delivery**

- Lecture: 64 hrs
- Tutorial: 10 hrs
- Practical: 72 hrs
- Home study: 72 hrs
- Report writing: 15 hrs
- Assignment: 10 hrs
- Presentation: 15 hrs

### ***Methods of Assessment:***

- Assignments
- Written exams (Class tests, Midterm exam, Final exam)
- Laboratory activities, reports and practical exam

### **Course policies:**

- Students are expected to have 100% attendance to lectures and to read all reading assignments in advance
- Students should have 100% attendance for the laboratory sessions
- Students should submit laboratory reports on due date
- Student should submit all group and/or individual assignments on due date

- Student should take all continuous assessments and practical exams as scheduled.

### ***References***

1. P. J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences, 5<sup>th</sup> Edition, Lippincott Williams & Wilkins, Philadelphia, 2006.
2. M. J. Wilson, Pharmaceutical Compounding and Dispensing, Pharmaceutical press, 2006.
3. L. V. Allen, N. G Popovich, H. C Ansel, Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 8<sup>th</sup> edition, Lippincott Williams & Wilkins, 2004.
4. J. E. Thompson and L. Davidow, a Practical Guide to Contemporary Pharmacy Practice, 2<sup>nd</sup> edition, Lippincott Williams & Wilkins, 2003.
5. A. Martin, J. Swarbrick and A. Cammarata, Physical Pharmacy, 3<sup>rd</sup> Edition, Lea & Febiger, Philadelphia, 1983.
6. A. T. Florence and D. Attwood, Physico-chemical Principles of Pharmacy, Macmillan Publishers Ltd., London, 1981
7. S. C. Wallwork and D. J. W. Grant, Physical Chemistry for Students of Pharmacy and Biology, 3<sup>rd</sup> Edition, Longman Group Ltd., London, 1977.
8. M. E. Aulton, Pharmaceutics: the science of dosage form design, 2<sup>nd</sup> ed., Churchill Livingstone, Edinburgh, 2002.

**Module Name: Dosage form Sciences**

**Module Number: 09**

**Course Title: Integrated Physical Pharmacy and Pharmaceutics II**

**Course Code: Phar2092**

**Course EtCTS: 9**

**Contact Hours: 243**

**Prerequisite: Integrated Physical Pharmacy and Pharmaceutics I**

**Co-requisite: None**

***Course Description:***

The design of the course is based on the integration of the study of physico-chemical principles of pharmacy with the formulation, preparation and stabilization of semisolid and solid pharmaceutical dosage forms. In line with this, the course deals with scientific principles related to thermodynamic and electrical properties of colloidal systems, and diffusion and dissolution theories associated with drug release kinetics from dosage forms. The module is also designed to enable students apply these theories and principles for the formulation and production of semisolid and solid dosage forms in the practical compounding sessions and thereafter during their professional career. The principles of drug degradation mechanisms, rate and kinetic theories of chemical reactions are also included for their application in the determination of product shelf-life and stability studies. The applications of pharmaceutics in cosmetics, overview of radiopharmaceuticals and veterinary dosage forms are also included.

**Course Objectives:**

Upon completion of this course, students will be able to:

- Apply the physicochemical, electrical and thermodynamic properties of colloidal particles for the formulation of acceptable disperse systems
- Develop the knowledge and skills of formulation, compounding and dispensing of semisolid and solid dosage forms
- Select and characterize appropriate formulation excipients and packaging materials for pharmaceutical dosage forms and labeling thereof

- Describe the theories of diffusion and dissolution and apply for the determination of drug release kinetics from a dosage form
- Describe the different approaches of product stability studies and determine the shelf-life and expiry date of pharmaceutical products
- Identify the different types of formulation incompatibilities and their effect on the physicochemical and therapeutic performance of products
- Describe the different types of radiopharmaceuticals and their application, handling and storage precautions
- Apply the knowledge and skills of pharmaceutics in cosmetics
- Identify the important considerations while dealing with veterinary dosage forms

### **Course Content:**

#### 1. Semisolid dosage forms (14 hrs)

- Introduction
- Classification of semisolids
- Desired properties of semisolids

#### Ointments and Pastes (6 hrs)

- Introduction (Definitions, Properties and applications)
- Formulation (ideal properties of bases, types of bases)
- Preparation of ointment and pastes
- Packaging, labeling and storage

#### Creams (2 hrs)

- Introduction (Definition, types and properties of creams)
- Formulation
- Methods of preparation
- Packaging, labeling and storage

#### Gels (3 hrs)

- Introduction (Definition and applications)
- Classification
- Formulation (Gelling agents, factors affecting gelation)
- Syneresis and swelling of gels



- Preparation of gels
  - Packaging, labeling and storage
2. Suppositories and Pessaries (7 hrs)
- Introduction (Definition and applications)
  - Formulations (desirable properties of bases, classification of bases, other excipients)
  - Preparation of suppositories
    - Calibration of moulds, determination of displacement value
    - Methods of preparation: fusion and compression
    - Packaging, labeling and storage
3. Micromeritics (8hrs)
- Particle size and size distribution
  - Methods for determination of particle size and size distribution
  - Particle shape and surface area
  - Methods for determination of surface area
  - Derived properties of powders (densities, porosity, packing arrangement, flowability)
4. Powders and granules (4 hrs)
- Powders as a dosage forms
    - Introduction (definition, classification and applications)
    - Preparation (size reduction, mixing and packing)
    - Challenges of powder dosage forms; eg, eutectic mixtures
  - Granules as dosage formsp
    - Granulated preparations
    - Effervescent granules and methods of preparations
5. Diffusion and Dissolution (6 hrs)
- Introduction (osmosis, dialysis, diffusion)
  - Fick's law of diffusion (steady state, diffusion through a membrane)
  - Applications of diffusion
  - Dissolution of particles (Noyes-whetney equation, factors affecting dissolution)
  - Intrinsic dissolution rate

- Sink conditions, Lag time and burst effects
- Hixon-crowel equation
- 6. Kinetics and Drug Stability (10 hrs)
  - Introduction
  - Rates and orders of reactions
  - Physical degradation
  - Chemical degradation (mechanisms and stabilization approaches)
  - Factors affecting stability of drugs
  - Influence of temperature on reaction rates (Arrhenius equation)
  - Stability study (real time and accelerated stability study)
  - Prediction of shelf life
- 7. Introduction to radiopharmaceuticals (2 hrs)
 

Formulation aspects, stability and handling of radiopharmaceuticals
- 8. Incompatibilities in formulation (2 hrs)
- 9. Cosmetics (9 hrs)
  - Introduction
  - Hair cosmetics
  - Skin cosmetics
  - Deodorants and antiperspirants
  - Oral care products
  - Nail products
  - Eye cosmetics
  - Lip products
- 10. Veterinary dosage forms (4 hrs)

### **Mode of Delivery**

- |   |                        |
|---|------------------------|
| ▪ Illustrated lecture: 64 hrs                 | • Assignment: 17 hrs   |
| ▪ Demonstration and Practical session: 48 hrs | • Presentation: 15 hrs |
| ▪ Report writing: 15 hrs                      |                        |
| ▪ Home Study: 70 hrs                          |                        |

## Mode of Assessment

- Written mid exam: 30%
- Practical skill and competency based exams: 25 %
- Assignments (Group and/or individual): 10%
- Written final exam: 35%

## Course Policies:

- Students are expected to have 100% attendance and to read all reading assignments in advance
- Students must attend and perform 100% of the practical laboratory sessions
- Student should submit all group and/or individual assignments and laboratory reports on due date
- Student should take all continuous assessments as scheduled
- Student should do his/her own work and actively participate during the presentation.

## References

1. P. J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences, 5<sup>th</sup> Edition, Lippincott Williams & Wilkins, Philadelphia, 2006.
2. M. J Wilson K, Pharmaceutical Compounding and Dispensing, Pharmaceutical press, 2006.
3. L. V Allen, N. G Popovich, H. C Ansel, Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 8th edition, Lippincott Williams & Wilkins, 2004.
4. J. E Thompson and L. Davidow, a Practical Guide to Contemporary Pharmacy Practice, 2nd edition, Lippincott Williams & Wilkins, 2003.
5. A. Martin, J. Swarbrick and A. Cammarata, Physical Pharmacy, 3rd Edition, Lea & Febiger, Philadelphia, 1983.
6. A. T. Florence and D. Attwood, Physico-chemical Principles of Pharmacy, Macmillan Publishers Ltd., London, 1981
7. S. C. Wallwork and D. J. W. Grant, Physical Chemistry for Students of Pharmacy and Biology, 3rd Edition, Longman Group Ltd., London, 1977.
8. M. E. Aulton, Pharmaceutics: the science of dosage form design, 2nd ed., Churchill Livingstone, Edinburgh, 2002.
9. Hardee, G. E. and Baggot, J. D., Development and Formulation of Veterinary Dosage Forms, 2nd ed. Marcel Dekker, Inc. New York, 1998.
10. Breuer, M. M., Cosmetic Science, Academic Press, London, 1978.

## **Module 10: Pharmacology Module**

**Module name:** Pharmacology module

**Module category:** Core

**Module code:** Phar-M2101

**Module number:** 10

**Module weight in EtCTS:** 17

**Courses:** Pharmacology I (Phar2101) (7 EtCTS)

Pharmacology II (Phar3102) (7 EtCTS)

Applied Toxicology (Phar3103) (3 EtCTS)

### **Module description**

The pharmacology module will familiarizes the pharmacy students about the drugs, their pharmacokinetics, pharmacodynamic, clinical indication, contraindication, drug interaction and adverse effect of the therapeutically used drugs. In addition to that the module introduces the students about poisons, and management of poisoning agents. By incorporating what they learn in the theoretical aspect in to the laboratory attachment they will become well organized and well oriented professional.

**Module objective:** The objective of the module is to impart fundamental knowledge, skill on the pharmacokinetics, pharmacodynamic, therapeutic use and toxic effects drugs of both therapeutically benefit or toxic/poisoning agents.

### **Module competency:**

- Apply the knowledge and skill of Pharmacology and toxicology in drug therapy decision

**Mode of delivery:** Blocked with Medicinal chemistry module

Total time

Lecture

Practical/lab session

Independent study hour

Seminar

Assessment

### **Mode of Assessment:**

Quizzes

TestFinal Exam

Practical exam

Seminar

Assignment

**Module learning teaching methods**

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group & individual presentation, assignment, project work, and laboratory work.

**Pharmacology module courses syllabi**

Course title: Pharmacology I

Course code: Phar2101

Course EtCTS: 7 EtCTS (189 hrs)

- Lecture: 64 hours
- Laboratory: 30 hours
- Tutorial: 32 hours
- Home study: 40 hours
- Assignment and presentation: 16 hours
- Assessment : 7 hours

Contact hours/ week: 189- 40= 149 hours/ 16 weeks= 9 hours

Pre-requisite if any:

- Biochemistry I and II
- Physiology I and II
- Human Anatomy








Course description:

- This course is designed to enable graduate Pharmacists describe drugs used for treatment, diagnosis and prevention of diseases. Up on completion of this course, students will be able to explain the pharmacological actions, mechanism of actions, adverse reactions, therapeutic uses and pharmacokinetics of drugs affecting the nervous system, respiratory system, gastrointestinal system and autacoids. In addition to attending class room sessions, students will have the opportunity to work in Pharmacology Laboratory and will be able to practice selected basic experimental demonstration




Course objectives:

- At the end of this course, students will be able to describe drugs acting on the nervous system, respiratory system, gastrointestinal system and explain autacoids and drug therapy of inflammation.

Schedule of contact time, contents/topics & reading/reference materials for each topic

| Week  | Contact hrs | Topic/sub-topic/chapter  | Reading materials |
|-------|-------------|--|-------------------|
| One   | 9           | 1. General pharmacology<br> Introduction: Definition, Scope and Branches of Pharmacology<br>History of Pharmacology, Drug: Definition, Sources and Nomenclature<br> Pharmacokinetics:<br>❖ Introduction, Absorption of Drugs and Routs of Drug Administration<br>❖ Drug Distribution<br>❖ Biotransformation<br>❖ Elimination of Drugs  | A, B              |
| Two   | 6           |  Basics of Clinical Pharmacokinetics and Posology<br> Pharmacodynamics:<br>❖ Introduction, Receptors and General Mechanisms of Drug Action<br>❖ Drug Receptor Interaction: Drug Receptor Theories, Dose-Response Relationships, Receptor-Effector Coupling and Spare Receptors   | A, B              |
| Three | 6           | ❖ Pharmacodynamic Drug Interactions<br>❖ Adverse Drug Reactions, Describing Drug Toxicity (LD <sub>50</sub> and Therapeutic Index)<br>❖ Development and Evaluation of New Drugs<br>❖ Gene Therapy  | A, B, D           |
| Four  | 9           | 2. Drug affecting the autonomic nervous system<br> Anatomy and Physiology of the Autonomic Nervous System<br> Autonomic Neurotransmission:<br> Classification of Autonomic Drugs<br>❖ Cholinoceptor Blocking Drugs: Antimuscarinic Drugs<br>❖ Ganglionic Blocking Drugs, Neuromuscular Blocking Drugs | B                 |
| Five  | 9           | ❖ Sympathomimetic Drugs: Direct Acting Sympathomimetics, Indirect Acting Sympathomimetics  | B                 |
| Six   | 6           | ❖ Adrenergic Receptor Blocking Drugs: Adrenergic Receptor Antagonists, $\beta$ -Adrenergic Receptor Antagonists, Combined, Adrenergic Receptor Blocking Agents   | B                 |

|          |   |   |      |
|----------|---|---|------|
| Seven    | 9 | 3. Drugs acting on the central nervous system<br><ul style="list-style-type: none"> <li>Anatomy and Physiology of the Central Nervous System</li> <li>Central Neurotransmitters, Classification of CNS Drugs</li> <li>General Anesthetics</li> <li>Anaesthetics</li> <li>Sedatives and Hypnotics: Benzodiazepines, Non-Benzodiazepines, Barbiturates</li> </ul> | A, E |
| Eight    | 9 | <ul style="list-style-type: none"> <li>Aliphatic Alcohols</li> <li>Centrally Acting Muscle Relaxants</li> <li>Opioid Analgesics and Antagonists</li> <li>Analeptics/ CNS Stimulants/ and Psychotomimetics</li> </ul>  | A, E |
| Nine     | 9 | <ul style="list-style-type: none"> <li>General Aspects of Psychopharmacology</li> <li>Drugs for the treatment of Psychosis (Antipsychotics)</li> </ul>  | A, E |
| Ten      | 9 | <ul style="list-style-type: none"> <li>Drugs for the treatment of Depression</li> <li>Drugs for the treatment of Anxiety and Mood Disorders</li> <li>Drugs for the treatment of Neurodegenerative Disorders</li> </ul>  | A, E |
| Eleven   | 9 | <ul style="list-style-type: none"> <li>Antiepileptic Drugs</li> <li>Social Pharmacology: Drug Dependence</li> </ul>   | A, E |
| Twelve   | 9 | 4. Autacoids and drug therapy of inflammation<br><ul style="list-style-type: none"> <li>Histamine and Its Antagonists</li> <li>5-Hydroxytryptamine and Its Antagonists; Bradykinin and Its Antagonists</li> <li>Lipid Derived Autocoids/Ecosanoids/ and Platelet Activating Factor/PAF/</li> </ul>  | B, D |
| Thirteen | 9 | <ul style="list-style-type: none"> <li>Analgesic and Antipyretics: Non-Steroidal</li> <li>Anti-inflammatory Drugs, Treatment of Rheumatoid Arthritis and Gout</li> </ul>  | B, D |
| Fourteen | 9 | 5. Drugs Acting on the Respiratory System<br><ul style="list-style-type: none"> <li>Drugs for the Treatment of Asthma</li> <li>Antitussives, Expectorants and Nasal Decongestants (1hr)</li> </ul>  | C    |

|         |   |   |   |
|---------|---|---|---|
| Fifteen | 9 | 6. Drugs Acting on the Gastrointestinal System<br> Drugs for the treatment of Peptic Ulcer Disease<br> Drugs for the Treatment of Constipation: Laxatives and Cathartics; Drugs for the Treatment of Diarrhea:<br> Antidiarrheals, Emetics and Antiemetics, Digestants | B |
|---------|---|---|---|

Delivery mode/methodology:

- Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group and individual presentation, assignment, project work, and laboratory work.

Assessment mechanisms:

Continuous assessment & summative assessment

- Quiz (10%)
- Test: 15%
- Assignments (15%)
- Laboratory Report (20%)
- Final Exam (40%)
- 

References:

- Goodman and Gilman's: The Pharmacological Basis of Therapeutics; 10<sup>th</sup> or later edition.
- Katzung B.G.: Basic and Clinical Pharmacology: 9<sup>th</sup> or latter edition
- Rang H.P. and Dale M.M. : Pharmacology; 5<sup>th</sup> edition
- Mycek M.J. Harvey R.A. Lipincott's Illustrated Reviews: Pharmacology; 4<sup>nd</sup> and later edition
- Richard A. LEHNE. Pharmacology for Nursing care. 5<sup>th</sup> and later editions.



**Course title: Pharmacology II**

Course code: Phar 3102

Course EtCTS: 7 ECTS (189 hrs)

- Lecture: 64 hours
- Laboratory: 30 hours
- Tutorial: 32 hours
- Home study: 40 hours
- Assignment and presentation: 16 hours
- Assessment : 7 hours

Contact hours/ week:  $189 - 40 = 149$  hours/ 16 weeks = 9 hours

pre-requisite if any:

- Pharmacology I

Course description:









- This course is a continuation of Pharmacology I. It is designed to enable graduate Pharmacists describe drugs that are not addressed in Pharmacology I and are used for treatment, diagnosis and prevention of diseases. Up on completion of this course, students will be able to explain the pharmacological actions, mechanism of actions, adverse reactions, therapeutic uses and pharmacokinetics of clinically useful drugs. In addition to attending class room sessions, students will have the opportunity to work in Pharmacology Laboratory and will be able to practice selected basic experimental demonstration.

Course objectives:

- At the end of this course, students will be able to describe drugs acting on various organs and systems and drugs used for the treatment of Infectious Diseases and Neoplastic Diseases. Schedule of contact time, contents/topics & reading/reference materials for each topic

| Week  | Contact hrs | Topic/sub-topic/chapter   | Reading materials |
|-------|-------------|---|-------------------|
| One   | 9           | <p>1. Drugs acting on the kidney</p> <ul style="list-style-type: none"> <li>Introduction: Urine Formation, Renal Tubular Transport Processes, Principles of Diuretic Action (1hr)</li> <li>Diuretics: Carbonic Unhydrase Inhibitors, Loop Diuretics, Thiazide Diuretics, Potassium Sparing Diuretics and Osmotic Diuretics</li> <li>Vasopressin and Other Agents Affecting Renal Conservation of Water</li> </ul> | A, B              |
| Three | 9           | <ul style="list-style-type: none"> <li>Drugs Used for the Treatment o f Heart Failure</li> <li>Drugs for the Treatment of Cardiac Dysrrhythmias</li> <li>Lipid Regulating Drugs</li> </ul>  | A, B, D           |
| Five  | 9           | <p>4. Vitamins, hormones and hormone antagonists</p> <ul style="list-style-type: none"> <li>Vitamins: Water Soluble Vitamins and Fat Soluble Vitamins</li> <li>Introduction; Anterior Pituitary Hormones: Growth Hormone and Its Antagonists, Prolactin, Gonadotropins</li> <li>Thyroid and Antithyroid Drugs</li> </ul>  | B                 |
| Six   | 9           | <ul style="list-style-type: none"> <li>Pancreatic Hormones: Drugs for the Treatment of Diabetes Mellitus- Insulin and Oral Hypoglycemic Agents</li> <li>Corticosteroids</li> <li>Sex Hormones: Estrogens, Anti-Estrogens and Estrogen Receptor Modulators Progestins, Anti-Progestins and Progesterone Receptor Modulators</li> <li>Hormonal Contraceptives, Androgens and Anabolic Steroids</li> </ul>           | A, B              |

|        |   |   |      |  |
|--------|---|---|------|--|
|        |   | 5. Anti-infective drugs   |      |  |
| Seven  | 6 | <ul style="list-style-type: none"> <li> Principles of Antimicrobial Therapy</li> <li> Antiseptics and Disinfectants</li> <li> Cell Wall Synthesis Inhibitors: <math>\beta</math>-lactam Antibiotics and Other Cell Wall Synthesis Inhibitors</li> </ul>  | A, B |  |
| Eight  | 9 | <ul style="list-style-type: none"> <li> Protein Synthesis Inhibitors: Aminoglycosides</li> <li> Tetracyclines, Chloramphenicol, Macrolides, Streptogramins, Oxazolidinones</li> <li> Antimetabolites: Sulfonamides, Trimetoprim, Trimetoprim-Sulfamethoxazole</li> <li> Quinolones and Urinary Antiseptics</li> </ul> | A, D |  |
| Nine   | 9 | <ul style="list-style-type: none"> <li> Antimycobacterial Drugs: Drugs for the Treatment of Tuberculosis</li> </ul>  | A, B |  |
| Ten    | 9 | <ul style="list-style-type: none"> <li> Antifungal Drugs: <ul style="list-style-type: none"> <li>➤ Systemic Antifungal Agents; Amphotericin B, Flucytosine, The Azoles, Echinocandins, Allylamines</li> <li>➤ Topical Antifungal Agents; Nystatin, Topical Azoles, Topical Allylamines</li> </ul> </li> </ul>  | A, D |  |
| Eleven | 9 | <ul style="list-style-type: none"> <li> Antiviral Agents: Introduction, Agents to Treat Herpes Simplex Virus (HSV) &amp; Varicella Zoster Virus (VZV) Infections, Agents to Treat Cytomegalovirus (CMV) Infections, Drugs for Influenza Virus Infection, Drugs for Respiratory Syncytial Virus Infection</li> </ul>  | A, c |  |

|          |   |   |         |
|----------|---|---|---------|
| Twelve   | 9 |  Antiretroviral Drugs  | A, B, D |
| Thirteen | 9 |  Drugs Used for the Treatment of Parasitic Infections<br> Drugs Used for the Treatment of Malaria<br> Drugs Used for the Treatment of Amebiasis, Giardiasis, Trichomoniasis, Leishmaniasis, and Trypanosomiasis<br> Anthelmintics | B, D    |
| Fourteen | 9 | 6. Antineoplastic Drugs   | A       |
| Fifteen  | 9 | 7. Immunomodulators   | B       |
| Sixteen  | 9 | 8. Dermatological Pharmacology<br> Drug Used for the Treatment of Skin Problems:<br>Pediculicides and Scabicides<br>Sunscreens and Agents Affecting Pigmentation<br> Drugs for the Treatment of Acne<br> Drugs for the Treatment of Psoriasis  | c       |

**Delivery mode/methodology:**

Active learning methods (brain storming, buzz group, discussion, etc), Lecture, group and individual presentation, assignment, project work, and laboratory work.

**Assessment mechanisms:**

**Continuous assessment & summative assessment**

- Quiz (10%)
- Test: 15%
- Assignments (15%)
- Laboratory Report (20%)
- Final Exam (40%)

**References:**

- A. Goodman and Gilman's: The Pharmacological Basis of Therapeutics; 10<sup>th</sup> or later edition.
- B. Katzung B.G.: Basic and Clinical Pharmacology: 9<sup>th</sup> or latter edition
- C. Rang H.P. and Dale M.M.: Pharmacology; 5<sup>th</sup> edition
- D. Mycek M.J. Harvey R.A. Lipincott's Illustrated Reviews: Pharmacology; 4<sup>nd</sup> and later edition

**Course title: Applied toxicology**

**Course code: Phar 3103**

**Lecture: 32 hours**

- Tutorial: 16 hours
- Home study: 20 hours
- Presentation : 8
- Assessment : 5

Contact hours/ week:  $81 - 20 = 61$  hours/16 weeks = 4

Pre-requisite: Pharmacology

Schedule of contact time, contents/topics & reading/reference materials for each topic

Delivery mode/methodology:

Active learning methods (brain storming, discussion, etc), Lecture, group and individual presentation, assignment, and laboratory, report writing

Assessment mechanisms:

**Course Title**

**Applied Toxicology**

**Course Code**

Phar 3103

**Credit Hours**

2

**Year & Semester**

Year III Semester I

**Course Category**

Major course

**Pre-requisite**

Pharmacology II

**Course EtCTS: 3 (81 hours)**

- Lecture: 32 hours
- Tutorial: 16 hours
- Home study: 20 hours
- Presentation : 8
- Assessment : 5

Contact hours/ week:  $81 - 20 = 61$  hours/16 weeks = 4

**Course Description**

The course covers general principles of toxicology; routes and types of exposure to toxicants, with reference to pesticides, air pollutants, organic solvents and vapours, heavy metals, household chemicals and drugs. Principles and methods of testing for toxicity are discussed together with forensic toxicology. There is an introduction to occupational and regulatory toxicology, the poison centre, general and specific measures to be taken during poisoning. Each student undertakes a project on a case of drug overdose management.

## Course Objectives

To provide students with a conceptual framework for understanding the broad spectrum of toxicological problems encountered in the environment and during the development and use of drugs

## Course Content

|  |    |
|--|----|
| 1. Introduction .....  | 1  |
| 1.1. Definition  |    |
| 1.2. History   |    |
| 1.3. Branches  |    |
| 1.4. Scope and Application                                   |    |
| 2. Experimental Toxicology .....                             | 3  |
| 2.1. Dose Response Relationship                              |    |
| 2.2. Evaluation of Drug Toxicity in lower animals & in man   |    |
| 2.3. LD50  |    |
| 2.4. Categories of Toxicologic Tests                         |    |
| 3. Drug Toxicity .....                                       | 2  |
| 3.1. General principles                                      |    |
| 3.2. Pharmacological Toxicity-acute Vs chronic Toxicity      |    |
| 3.3. Pharmacogenetics and Idiosyncrasy                       |    |
| 3.4. Drug Allergy  |    |
| 4. Industrial Toxicology .....                               | 1  |
| 5. Heavy Metal Poisoning .....                               | 3  |
| 5.1. Chemicals Involved                                      |    |
| 5.2. Mechanisms of Toxicity and Toxic Manifestations         |    |
| 5.3. Heavy Metal Antagonists                                 |    |
| 6. Non-Metallic Environmental Toxicants .....                | 2  |
| 6.1. Air and water pollutants                                |    |
| 6.2. Organic Solvents and Vapor                              |    |
| 6.3. Utility gases   |    |
| 7. Pesticides and other Agricultural Toxicants .....         | 2  |
| 8. Teratogenic and Carcinogens .....                         | 2  |
| 8.1. Def. And Terms  |    |
| 8.2. Chemical Groups involved                                |    |
| 8.3. Mechanics of Induction                                  |    |
| 8.4. The Thalidomide Catastrophe                             |    |
| 9. Clinical Toxicology .....                                 | 10 |
| 9.1. Def and Scope   |    |
| 9.2. Toxicology of some common drugs and household chemicals |    |

|  |           |
|--|-----------|
| 9.2.1. Salicylates   |           |
| 9.2.2. Barbiturates  |           |
| 9.2.3. Alkaloids   |           |
| 9.2.4. Phenothiazines  |           |
| 9.2.5. Cyanide   |           |
| 9.2.6. Poisons of Animal Origin (venoms)                       |           |
| 9.2.7. Poisons of plant origin                                 |           |
| 9.2.8. Cleaning & polishing agents                             |           |
| 9.2.9. Food & food additives                                   |           |
| 9.3. General Principles of Treatment                           |           |
| 9.3.1. Principles on non-specific Therapy (emergency measures) |           |
| 9.3.2. Supportive Therapy                                      |           |
| 9.3.3. Emesis, Diuresis, Purgation, lavage dialysis            |           |
| 9.3.4. Antidots (Principles and mechanisms)                    |           |
| 10. Forensic Toxicology .....                                  | 2         |
| 10.1. Def. and Scope   |           |
| 10.2. Examination Methods                                      |           |
| <b>Total</b>   | <b>28</b> |

|                           |   |
|---------------------------|---|
| <b>Mode of Delivery</b>   | - Lecture (28 Hours)                          |
|                           | - Case Presentation and Discussions (4 Hours) |
| <b>Mode of Evaluation</b> | Continuous assessment & summative assessment  |
|                           | - Quiz (10%)                                  |
|                           | - Test: 15%                                   |
|                           | - Assignments (15%)                           |
|                           | - Laboratory Report (20%)                     |
|                           | - Final Exam (40%)                            |
|                           | -   |

## Reference Books

1. Doull, J., Kalassen, C.D., and Amdur, M.D., (eds.) Casarett and Doull's Toxicology, the Basic science of poisons, 10th Ed, MCGraw Hill, 2010.
2. Timbrell, J.A. Introduction to Toxicology, Taylor and Francis Ltd. 4<sup>th</sup> ed. 2009.
3. Peter Viccellio. Handbook of medical toxicology (2008)
4. Lester M. Haddad et al. Clinical management of poisoning and drug overdose (2008)

**Module 11: Medicinal chemistry module****Module name:** Medicinal Chemistry module**Module category:** Core**Module code:** Phar-M2111**Module Number:** 11**Module weight in EtCTS:** 12 EtCTS**Courses:** Medicinal Chemistry I (Phar2111) (7 EtCTS)

Medicinal Chemistry II (Phar3112) (5 EtCTS)

**Module description**

Medicinal chemistry is a chemistry-based discipline involving aspects of biological, medical and pharmaceutical sciences. It is the application of chemistry in the context of human medicine. The general purpose of this Module is to train highly qualified pharmacists who are competent in the invention, discovery, design, identification and preparation of biologically active compounds, the study of their metabolism, the interpretation of their mode of action at the molecular level and the construction of structure-activity relationships. Besides, this module helps the student in their future carrier especially in pharmaceutical industry drug research and development sections, in research institutions and in universities. Students will gain an appreciation for the drug development process, together with brief introduction to the drug discovery and designing methods, and also deals with the chemistry of various classes of drugs that act on different systems and organs of human body, and reviews the general principles of drug action and the pharmacological activities of various classes of drugs. The major focus is on the molecular mechanisms of drug action, with a detailed discussion of one or more prototypes of each drug class, which includes drugs acting on; autonomic nervous system, central nervous system, Histamine and histamine antagonists, non-narcotic analgesics, drugs used in gout; Antidiabetics, cardiovascular drugs; vitamins; pesticides; diagnostic agents; expectorants and antitussives; non-steroidal and steroidal hormones, local and general anesthetics, chemotherapeutic and products of biotechnology

**Module objective:** Upon completion of the module; students have concept of drug at molecular level to which they understand the effect of structure on the pharmacokinetics and pharmacodynamics. Students are able to apply the knowledge in drug design, discovery and development.

**Module competencies:**

- Understand and demonstrate principles and practice of medicinal chemistry
- Discuss and Practice on different methods employed in drug design that helps to drug discovery and development
- Ability to follow and critically interpret the latest advances in the theory and practice of medicinal Chemistry
- Describe, identify and classify drugs based on their chemical structure, pharmacological action and site of drug action



- Relate the relevance of structure to pharmacological action
- Explain the principles of drug action and the role of bonding in drug-target interactions
- Discuss and Analyze the structural activities relationships of different compounds
- Develop skill to identify and synthesize biologically active compounds using standard methods of synthesis
- Identify and Practice on naming of pharmaceutical products
- Understand the basic biotransformation of organic compounds
- Suggest chemistry based application of biologically active compounds in advance; evaluate the probable side effect and adverse reactions
- Participate in problem solving drug development strategies
- Describe the physicochemical properties of biologically active compounds and currently available drugs
- Apply the knowledge and skill in drug therapy decision making process
- Transfer knowledge obtained from medicinal chemistry

**Mode of delivery:** Blocked with pharmacology module

Total time: 324hrs

Lecture: 104hrs

Tutorial: 32hr

Independent study hour: 152hrs

Seminar, Assignment: 24hrs

Assessment: 12hr

**Mode of Assessment:**

Quizzes (15%)

Final Exam (40%)

Seminars (10%)

Assignments(15%)

Case presentation(10%)

Viva voca (10%)

**Learning activities and teaching methods**

Interactive lectures, case studies, computer assisted learning, formative problem-solving exercises, self-directed learning through virtual learning environment and technologies.

**Teachers' and students' role**

**Teacher's role**

Course instructors are expected to:

- Organize group discussions
- Provide lecture and guide students
- Providing assignments and feedbacks for students (reading, working)
- Prepare lecture note, Assignment topics and title for group discussions

- Select seminar title and advise students in preparation and presentations
- Prepare assessing questions and examine students
- Prepare cases

#### **Student's role**

Students are expected to:

- Attend each lecture classes and Be an active participant in class discussion (ask questions and answering questions)
- Read text books, lecture handouts and reference books
- Prepare and present seminar papers
- Analyze and evaluate different literatures, reference books and journal articles
- Present case studies
- Take exams

#### **Medicinal chemistry module syllabi**

|                           |  |
|---------------------------|--|
| <b>Module Number</b>      | <b>11</b>  |
| <b>Course Title</b>       | <b>Medicinal Chemistry I</b>   |
| <b>Course Code</b>        | <b>Phar2111</b>  |
| <b>Course EtCTS</b>       | <b>7 (189hours)</b>  |
| <b>Pre-requisite</b>      | <b>Introductory Organic Chemistry, Practical Organic Chemistry</b>   |
| <b>Co-requisite</b>       | <b>Pharmacology I</b>  |
| <b>Course Description</b> | Medicinal chemistry is the application of chemistry in the context of human medicine. In this course students will gain an appreciation for the drug development process, together with brief introduction to the drug discovery and designing methods, and also deals with the chemistry of various class of drugs that act on different systems and organs of human body, which includes drugs acting on; autonomic nervous system, drugs acting on the central nervous system, Histamine and histamine antagonists, non-narcotic analgesics and drugs used in gout; cardiovascular drugs; pesticides; expectorants and antitussives; nonsteroidal and steroidal hormones, local and general anesthetics. The course is designed to provide an in-depth scientifically grounded and clinically relevant medicinal chemistry learning experience for pharmacy students. |
| <b>Course Objectives</b>  | By the end of this course the students will able to understand methods employed in drug design, relationship between drugs and specific receptors, structures, reactions, synthesis, structural activity relationship, metabolism and degradation of selected groups of drugs like autonomic nervous system drugs, cardiovascular drugs, antihistamines, steroidal and non-  |

steroidal hormone and related drugs.

### Supporting objective

- Describe the basic concepts in medicinal chemistry,
- Describe the basic concepts of drug design (the drug discovery and development process), and the strategies to achieve it.
- To describe the chemical basis of drug absorption, distribution, metabolism and Elimination,
- To recognize the important functional groups that act as weak acids and bases and to recognize the molecular and environmental factors that influence their precise ionization profiles.
- To explore the fundamentals of drug metabolism (both biotransformation and conjugation pathways) through an identification of drug mechanisms that include the activation of some prodrugs.
- To describe the chemical basis of drug-target interactions.
- To explore the structure-activity concepts related to the presence of specific functional groups in agonist and antagonist drug structures.
- To understand the links with specific therapeutic applications for agonists and antagonists acting at specific drug receptors
- To develop the ability to recognize superior therapeutic drug mechanisms and properties of drugs

### Course Content

|  |       |
|--|-------|
| 1. Introduction .....  | 4 hrs |
| 1.1. Definition of medicinal chemistry and its relation to other disciplines                               |       |
| 1.2. Source and classification of drugs  |       |
| 1.3. Nomenclature of drugs   |       |
| 1.4. Sources of drugs  |       |
| 1.5. Introduction to drug design, and physicochemical properties of drugs in relation to biological effect |       |
| 1.6. Stereochemistry and drug action   |       |
| 1.7. Receptors and drug action   |       |
| 1.8. Drug metabolism   |       |

|  |        |
|--|--------|
| 2. Drugs acting on the autonomic nervous system .....  | 14     |
| 2.1. Cholinergics  | hrs    |
| 2.2. Antimuscarinic drugs  |        |
| 2.3. Neuromuscular blockers  |        |
| 2.4. Ganglion blockers   |        |
| 2.5. Adrenergic drugs  |        |
| 2.6. Adrenergic blocking drugs   |        |
| 3. Drugs acting on the central nervous system .....  |        |
| 3.1. Sedatives & hypnotics (barbiturates, ureides, amides & imides, alcohols, carbamates, aldehydes & ketones) | 14 hrs |
| 3.2. Anticonvulsant drugs  |        |
| 3.3. Major tranquilizers (neuroleptics)  |        |
| 3.4. Minor tranquilizers (anxiolytics)   |        |
| 3.5. Central skeletal muscle relaxants   |        |
| 3.6. CNS stimulant drugs (Analeptics, Antidepressant drugs, CNS adrenergics, Miscellaneous stimulants)         |        |
| 3.7. Anti-parkinsonian drugs   |        |
| 3.8. Narcotic analgesics & antagonists   |        |
| 4. Diuretics and Cardiovascular agents .....   |        |
| 4.1. Diuretics   |        |
| 4.1.1.1. Carbonic anhydrase inhibitors   | 10     |
| 4.1.1.2. High-ceiling or loop diuretics  | hrs    |
| 4.1.1.3. The thiazide and thiazide-like diuretics  |        |
| 4.1.1.4. Potassium-sparing and other diuretics   |        |
| 4.2. Antianginal agents  |        |
| 4.3. Anti-hypertensive agents  |        |
| 4.4. Cardiac glycosides and derivatives  |        |
| 4.5. Antiarrhythmic drugs  |        |
| 4.6. Antilipemic drugs   |        |
| 4.7. Coagulants & anticoagulants, and other cardiovascular drugs   |        |
| 5. Non-narcotic analgesics & related drugs, and drugs used in gout .....                                       |        |
| 5.1. Non-narcotic analgesics   |        |
| 5.1.1.1. Salicylates   |        |
| 5.1.1.2. p-aminophenol derivatives   | 4 hrs  |
| 5.1.1.3. 5-pyrazolone derivatives  |        |
| 5.1.1.4. 3,5-pyrazolidinedione derivatives   |        |
| 5.1.1.5. Miscellaneous agents  |        |
| 5.2. Drugs used in the treatment of gout   |        |
| 6. Histamine, Antihistamine .....  |        |
| 6.1. Histamine and histamine receptors   |        |

|              |   |               |
|--------------|---|---------------|
| 6.2.         | H1-antagonists  |               |
| 6.3.         | H2-antagonists  | 2 hrs         |
| 7.           | Pesticides .....  |               |
| 7.1.         | Classification  |               |
| 7.2.         | Specific pesticides   |               |
| 8.           | Expectorants and antitussives .....                         | 2 hrs         |
| 8.1.         | Expectorants  |               |
| 8.2.         | Antitussives  |               |
| 9.           | Non-steroidal hormones and related drugs .....              | 2 hrs         |
| 9.1.         | Hormones of the hypothalamus                                |               |
| 9.2.         | Pituitary hormones  |               |
| 9.3.         | Thyroid hormones and anti-thyroid drugs                     | 3 hrs         |
| 9.4.         | Parathyroid hormone, calcitonin and calcium                 |               |
| 9.5.         | Pancreatic hormones   |               |
| 9.6.         | Insulin and oral hypoglycemic drugs (antidiabetic drugs)    |               |
| 10.          | Steroidal hormones and related drugs .....                  |               |
| 10.1.        | Male and female sex hormones, derivatives and related drugs |               |
| 10.2.        | Adrenocorticoids  |               |
| 11.          | Local and general anesthetics .....                         | 4 hrs         |
| 11.1.        | Local anesthetics   |               |
| 11.2.        | General anesthetics   |               |
|              |   | 3 hrs         |
| <b>Total</b> |   | <b>61 hrs</b> |

#### Mode of Delivery

- Lecture: 61 hrs
- Tutorial: 16hr
- Independent study hour: 88 hrs
- Seminar, Assignment: 12 hrs
- Assessment: 12hr

#### Mode of Evaluation

- Quizzes (15%)
- Final Exam (40%)
- Seminars (10%)
- Assignments(15%)
- Case presentation(10%)
- Viva voca (10%)

#### Text Book

*Lemke, T.L. and Williams, D.A., Roche, V.F., Zito, W.S. Foye's Principles of Medicinal Chemistry, 6th.*

ed. Lippincott Williams & Wilkins, 2008.

## Reference Books

1. J.H. Block and J.M. Beale, Gisvold, O. Wilson & Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 11th. ed. Lippincott Williams & Wilkins, 2004.
2. Donald J. Abraham(Ed.). Burgers's medicinal Chemistry and Drug Discovery, 2006, 6th edn., voll-6, wiley-interscience(USA).
3. Patric L. G. An introduction to medicinal chemistry, 1st, Oxford University Press inc, New York, 1995.
4. Reminton's Pharmaceutical Sciences, 18th edn. Mark publishing Co. Pennsylvania, 1990.
5. King, F.D. Medicinal Chemistry, Principles and Practice, The Royal Society of Chemistry, 1997.
6. Discher, C. Modern Inorganic Pharmaceutical Chemistry, 1980

**Module number**

**11**

**Course Title**

**Medicinal Chemistry II**

**Course Code**

**Phar 3112**

**Course EtCTS (Course hour)**

**5 (135 hrs)**

**Pre-requisite**

**Medicinal Chemistry I**

**Co-requisite**

**Pharmacology II**

**Course Description**

Medicinal Chemistry II is a continuation of medicinal chemistry I & covers; chemotherapeutic agents which includes antiseptics and disinfectants, preservatives, antifungal agents, urinary tract anti-infectives, antitubercular and antileprotic agents, topical agents, antiviral agents, antiprotozoal drugs, anthelmintics, antiscabies & antipedicular agents, sulfonamides, antibiotics & anticancer drugs; and products of biotechnology.

**Course Objectives**

After completion of this course, students will be able to understand the methods employed in drug design, relationship between drugs and specific receptors, structures, reactions, synthesis, structural activity relationship, metabolism and degradation of selected groups of drugs like drugs acting on the central nervous system; chemotherapeutic agents; and products of

biotechnology.

### Supporting objectives

- Describe the basic concepts in medicinal chemistry,
- Describe the basic concepts of drug design (the drug discovery and development process), and the strategies to achieve it.
- To describe the chemical basis of drug absorption, distribution, metabolism and Elimination,
- To recognize the important functional groups that act as weak acids and bases and to recognize the molecular and environmental factors that influence their precise ionization profiles.
- To explore the fundamentals of drug metabolism (both biotransformation and conjugation pathways) through an identification of drug mechanisms that include the activation of some prodrugs.
- To describe the chemical basis of drug-target interactions.
- To explore the structure-activity concepts related to the presence of specific functional groups in agonist and antagonist drug structures.
- To understand the links with specific therapeutic applications for agonists and antagonists acting at specific drug receptors
- To develop the ability to recognize superior therapeutic drug mechanisms and properties of drugs

### Course Content

|   |       |
|---|-------|
| 1. Oral hypoglycemic agents.....            | 2 hrs |
| 2. Gastrointestinal and related agents..... | 4 hrs |

H<sub>2</sub> receptor antagonists and related compounds

Proton pump antagonists and miscellaneous gastrointestinal Agents

3. Chemotherapeutic agents ..... 32 hrs
- 3.2. Introduction (1 hr.)
- 3.3. Antiseptics & disinfectants (1 hrs)
- 3.3.1.1. Definition, Classification, Alcohols and related compounds, Aldehydes, Phenols and their derivatives, Oxidizing agents, Halogen containing compounds, Cationic and anionic Surfactants, Dyes, Mercury compounds, Antiseptic nitrofurans derivatives
- 2.1. Preservatives (1 hr.)  
Definition, p-Hydroxybenzoic acid derivatives, p-Hydroxybenzoic acid derivatives, Other miscellaneous preservatives
- 2.2. Antifungal agents (2 hr.)  
Fatty acids, Substituted imidazoles and triazoles, Antifungal antibiotics (the polyenes and other), Miscellaneous antifungal agents
- 2.3. Antiviral agents (6 hr.)
- 2.3.1. Anti-HIV agents
- 2.3.2. Other antiviral drugs
- 2.4. Antiprotozoal agents (4 hr.)
- 2.4.1. Antimalarial drugs
- 2.4.2. Drugs used in amebiasis, giardiasis & trichomoniasis
- 2.4.3. Drugs used in other protozoal infections
- 2.5. Anthelmintic agents (2hr.)  
Antiscabies & antipedicular agents
- 2.6. Antibacterial agents and related drugs (8 hr.)
- 2.6.1. Introduction
- 2.6.2.  $\beta$ -lactam antibiotics and Glycopeptides
- 2.6.3. The aminoglycosides
- 2.6.4. The tetracyclines
- 2.6.5. The macrolides
- 2.6.6. The polypeptides, polyenes and lincomycin
- 2.6.7. Chloramphenicol
- 2.6.8. Sulfonamides and related drugs
- 2.6.9. Antitubercular & antileprotic agents
- 2.6.10. Urinary tract anti-infectives
- 2.6.11. Antimicrobial topical agents
- 2.6.12. Other antibacterial agents
- 2.7. Antineoplastic agents (5 hr.)
- 2.7.1. Chemotherapy



|   |       |
|---|-------|
| 2.7.2. Alkylating agents  |       |
| 2.7.3. Antimetabolites  |       |
| 2.7.4. Antibiotics  |       |
| 3. Vitamins and coenzymes .....   | 3 hrs |
| 3.1. Fat-soluble vitamins   |       |
| 3.2. Water-soluble vitamins   |       |
| 3.3. Co-enzymes   |       |
| 4. Antioxidants and autoxidation .....  | 2 hrs |
| 5. Diagnostic agents .....  | 2 hrs |
| 5.2. Radio-opaque agents  |       |
| 5.3. Classification   |       |
| Water-soluble contrast media, Water-insoluble contrast media, Iodized oils,<br>Diagnostic drugs for kidney function tests, Diagnostic drugs for liver function tests,<br>Miscellaneous diagnostic drugs |       |
| 6. Products of biotechnology .....  | 3 hrs |
| 6.2. Introduction   |       |
| 6.3. Techniques of biotechnology  |       |
| 6.4. Properties of biotechnologically produced medicinal agents   |       |
| 6.5. Medicinal agents produced by recombinant DNA technology  |       |

|              |               |
|--------------|---------------|
| <b>Total</b> | <b>48 hrs</b> |
|--------------|---------------|

**Mode of Delivery**

- Lecture: 48 hrs
- Tutorial: 12hr
- Independent study hour: 88 hrs
- Seminar, Assignment: 12 hrs
- Assessment: 12hr

**Mode of Evaluation**

- Quizzes (15%)
- Final Exam (40%)
- Seminars (10%)
- Assignments(15%)
- Case presentation(10%)

- Viva voca (10%)

**Text Book**

*Lemke, T.L. and Williams, D.A., Roche, V.F., Zito, W.S. Foye's Principles of Medicinal Chemistry, 6th. ed. Lippincott Williams & Wilkins, 2008.*

**Reference Books**

1. *J.H. Block and J.M. Beale, Gisvold, O. Wilson & Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 11th. ed. Lippincott Williams & Wilkins, 2004.*

2. Donald J. Abraham(Ed.). *Burgers's medicinal Chemistry and Drug Discovery*, 2006, 6th edn., voll-6, wiley-interscience(USA).
3. Patric L. G. *An introduction to medicinal chemistry*, 1st, Oxford University Press inc, New York, 1995.
4. *Reminton's Pharmaceutical Sciences*, 18th edn. Mark publishing Co. Pennsylvania, 1990.
5. King, F.D. *Medicinal Chemistry, Principles and Practice*, The Royal Society of Chemistry, 1997.
6. Discher, C. *Modern Inorganic Pharmaceutical Chemistry*, 1980

## **Module 12: Pharmaceutical Analysis Module**

**Module Name:** Pharmaceutical Analysis module

**Module category:** core

**Module Weight in EtCTS:** 14 EtCTS

**Module Number:** 12

**Module Code:** Phar-M3121

**Course Code:**

Pharmaceutical Analysis I: Phar3121 (7 EtCTS)

Pharmaceutical Analysis II: Phar3122 (7 EtCTS)

### **Module Description**

Pharmaceutical Analysis aims at cultivating students to the world of regulation, especially the areas of quality control, quality assurance and validation. It also encourages an interdisciplinary approach to problem solving in a modern analytical laboratory. This module introduces students to different analytical techniques with a focus on the basic working principles of the instruments, applications and limitations of the techniques, as well as data analysis. It also introduces the students to the principles of quality control and the regulatory process in assuring the quality, efficacy and safety of drug and drug products. In the module, students are exposed to different techniques such as various titration methods, simple physical and chemical tests for drug, electro-analytical methods, biological methods, radiochemical methods, extraction and analysis techniques using chromatography, electromagnetic radiation analysis (UV-visible, AAS, IR, NMR...), mass spectrometry, structural elucidation and elemental analysis within a wide number of key areas, particularly pharmaceutical and chemical analysis.

**Module objective:** Upon completion of the module, the student should have: a mature understanding of the theory and application of modern analytical techniques for chemical analysis; the ability to select the analytical method of choice for a particular circumstance; a deeper understanding of the regulatory matters and quality assurance principles currently in

practice for the manufacture and licensing of medicines; the ability to apply the modern knowledge gained in this course to provide practical solutions to real questions. It is intended to train highly qualified analysts involved in both quality assurance and quality control of pharmaceuticals and related substances. Maintain good manufacturing practice in manufacturing and assuring quality of Pharmaceutical products.

#### **Module Competencies:**

- Realize the importance of pharmaceutical quality control and the regulatory process in assuring the quality, efficacy and safety of drug and related products
- Reflect on the importance of standards for assuring the quality of drug products and consider the availability of pharmacopoeial standards and the importance of good manufacturing processes.
- Propose and implement the sampling and sample preparation procedures required for pharmaceutical analysis, and evaluate the appropriate methodologies and protocols for the required analytical goals.
- To provide an up-to-date understanding of the principles and application of current analytical techniques for the quantitative and qualitative measurement of pharmaceuticals drugs in a variety of real world matrices e.g. pharmaceutical, biological and environmental.
- Able to select the appropriate analytical techniques for given sample types to detect and quantify organic molecules and their application in the investigation of real-world problems.
- Confidently operate a range of instrumentation used in the modern pharmaceutical quality control laboratories.
- Apply laboratory skills to perform the test and to prepare written laboratory reports that provide a description of the experiment, explain the experiment and reasoning clearly, and provide an appropriate conclusion

#### **Mode of delivery:** Blocked

- Total study hours in the module:  $14 \times 27 = 378$ hrs
- Lecture: 117
- Tutorial: 16
- Seminars, assignments and Presentation: 20
- Practical/ Laboratory: 72
- Home study: 133
- Assessment: 20
- Visit pharmaceutical industry quality control unit: 6 hrs

#### **Mode of assessment**

- Seminar presentations
- Group assignments
- Laboratory works and report writing

- Practical exams
- Laboratory written exams
- Quizzes
- Final Exam

## **Learning Activities and Teaching Methods**

### **A. Learning Activities**

Students are expected to undertake among others the following major learning activities:

- Engage in learning by doing (independent study, group assignments, presentation, report writing, and etc...)
- Participation and discussions;
- Practical laboratory works including reagent and sample preparation, analysis, interpretation and report writing

### **B. Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments,
- Arrange and facilitate seminar sessions by inviting professionals for public lectures or practical works.
- Attachment to quality control laboratories
- Other specific information

## **Roles of Instructors and Students**

### **A. Roles of Instructors**

The instructor will be expected to:

- Be a facilitator (introduce the subject; give guidance, moderate discussions, etc.)
- Read and comment assignments of students on time;
- Prepare his/her lessons and deliver lectures;
- Guide laboratory works
- Provide available and necessary reference materials.
- Encourage active participation of students in the teaching learning process;
- Assist students with learning difficulties;
- Arrange attachment sites

### **B. Roles of Students**

Students are expected to:

- Engage in learning by doing (independent study, project work; group work, etc.)
- Be active learners (participate effectively in group assignments, make presentations, write reports, etc.);
- Be actively work in the laboratory experiments and on time laboratory reports
- Critically assess journal articles and related topics from book chapters.

## **Pharmaceutical Analysis Module syllabi**

|                                   |  |
|-----------------------------------|--|
| <b>Module Number</b>              | <b>12</b>  |
| <b>Course Title</b>               | <b>Pharmaceutical Analysis I</b>   |
| <b>Course Code</b>                | <b>Phar3121</b>  |
| <b>Course EtCTS (Course hour)</b> | <b>7 (189 hrs)</b>   |
| <b>Pre-requisite</b>              | <b>None</b>  |
| <b>Co-requisite</b>               | <b>None</b>  |
| <b>Course Description</b>         | This course covers pharmaceutical quality control aspects, various titrimetric methods such as acid base, argentometric complexometric, non-aqueous and miscellaneous titrimetry methods. Besides, it gives also the student theoretical knowledge on applications of biological, radiochemical and electrochemical techniques in quality control of pharmaceuticals. The course has 16 weeks of practical classes in which different titrimetric methods will be studied as employed in the estimation of the constituents of drugs included in the national drug list. |
| <b>Course Objectives</b>          | After completing this course, students will be able to understand the purpose of pharmacopoeia, importance of quality control, steps involved in drug analysis, sample pretreatment, different analytical methods and their use in pharmaceutical analysis. They will also able to propose suitable analytical technique for a sample, carry out analysis for different pharmaceuticals as well as handle, validation of analytical procedures, interpret and report data obtained from the analysis.  |
| <b>Supporting objectives</b>      | <ul style="list-style-type: none"> <li>• Describe what is meant by pharmaceutical analysis</li> <li>• Explain Purpose of pharmaceutical analysis</li> <li>• Describe quality control and quality assurance</li> <li>• Perform basic calculations in pharmaceutical analysis</li> <li>• Describe sample preparation for analysis</li> <li>• Describe titrimetry</li> <li>• Perform different titration</li> <li>• Describe electrochemical method of analysis</li> </ul>  |

## Course Content

|   |        |
|---|--------|
| 1. Introduction to pharmaceutical analysis .....                                    | 18 hrs |
| 1.1. Introduction to quality control and Quality Assurance (1 hrs)                  |        |
| 1.2. The compendia (3 hrs)  |        |
| 1.2.1. Pharmacopoeia and other official methods                                     |        |
| 1.2.2. General notices  |        |
| 1.2.3. Monographs   |        |
| 1.3. Analytical Errors, Validation of Analytical procedures (1 hrs)                 |        |
| 1.4. Basic calculations in pharmaceutical analysis (1 hrs)                          |        |
| 1.4.1. Percentage:  |        |
| - Percentage volume/volume (% V/V)  |        |
| - Percentage weight/volume (% W/V)  |        |
| - Percentage weight/weight (% W/W)  |        |
| 1.4.2. Parts per million (ppm) and parts per billion (ppb)                          |        |
| 1.4.3. Molarity (M)   |        |
| 1.4.4. Normality (N)  |        |
| 1.4.5. Dilutions  |        |
| 1.5. Physical and chemical properties of drug molecules (2 hrs)                     |        |
| 1.5.1. Calculation of pH  |        |
| 1.5.2. Acidic and basic strength and pKa  |        |
| 1.5.3. Buffers  |        |
| 1.5.4. Drug stability and stability study   |        |
| 2. Sample preparation for analysis .....  | 2 hrs  |
| 2.1. Steps in chemical analysis   |        |
| 2.2. Preliminary treatment of sample  |        |
| 3. Titrimetry .....   | 18 hrs |
| 3.1. Introduction (1 hrs)   |        |
| 3.1.1. End point and equivalence point  |        |
| 3.1.2. Direct titration, back titration and back titration with blank determination |        |
| 3.1.3. Calculations in titrimetry   |        |
| 3.1.4. Titration curves   |        |
| 3.2. Acid-Base titrations (6 hrs)   |        |
| 3.2.1. Acid-Base titrations in aqueous media  |        |
| 3.2.2. Acid-Base titrations in non-aqueous media                                    |        |
| 3.2.3. Applications   |        |
| 3.3. Precipitometric titrations (3 hrs)   |        |
| 3.3.1. Limitations  |        |

- 3.3.2. Solubility product
  - 3.3.3. Factors affecting solubility of precipitate
  - 3.3.4. Indicators
  - 3.3.5. Argentometric titrations
    - Mohr's method
    - Volhard's method
    - Fajan's method
  - 3.3.6. Mercurimetric titrations
  - 3.3.7. Applications
- 3.4. Complexometric titrations (3 hrs)
  - 3.4.1. Introduction
  - 3.4.2. Basic principles of complexometric analysis
  - 3.4.3. General principles in disodium edetate titrations
  - 3.4.4. Indicators and end point detection
  - 3.4.5. Applications
- 3.5. Redox titrations (4 hrs)
  - 3.5.1. Basic principles of redox titration
  - 3.5.2. Redox indicators
  - 3.5.3. Principles and procedures in different types of redox titration
    - Potassium permanganate methods
    - Ceric sulfate methods
    - Iodimetric and Iodometric methods
    - Bromination methods
    - Potassium iodate methods
    - Potassium dichromate methods
  - 3.5.4. Applications
- 3.6. Diazotization titration (1 hrs)
  - 3.6.1. Theory of diazotization reaction
  - 3.6.2. Applications
- 4. Gravimetry ..... 2 hrs
  - 4.1. Steps in gravimetric analysis
  - 4.2. Selected gravimetric methods
  - 4.3. Applications
- 5. Limit tests ..... 4 hrs
  - 5.1. Definition and importance
  - 5.2. Limits on ash values
  - 5.3. Limits on moisture content
    - Importance, Los on drying method, Azeotropic distillation method, Karl-Fischer titration method, Other methods
  - 5.4. Limit tests for some metals

|   |   |
|---|---|
| Lead, Arsenic, and Iron                                   |   |
| 5.5. Limit tests for some non-metals                      |   |
| Chloride, Sulphate  |   |
| 6. Electro-analytical methods .....                       | 11 hrs  |
| 1.1. Introduction (1 hrs)                                 |   |
| 1.1.1. Electrochemical cells                              |   |
| 1.1.2. Various types Electrodes                           |   |
| 1.1.3. Instrumentation and measurement of cell e.m.f.     |   |
| 1.2. Potentiometry (3 hrs)                                |   |
| 1.2.1. Principle  |   |
| 1.2.2. Applications in pharmaceutical analysis            |   |
| 1.3. Polarography (2 hrs)                                 |   |
| 1.3.1. Principle  |   |
| 1.3.2. Instrumentation                                    |   |
| 1.3.3. Applications in pharmaceutical analysis            |   |
| 1.4. Conductometry (3 hrs)                                |   |
| 1.4.1. Principles   |   |
| 1.4.2. Apparatus and measurement                          |   |
| 1.4.3. Applications of direct conductometric methods      |   |
| 1.5. Coulometry (2 hrs)                                   |   |
| 1.5.1. Principles   |   |
| 1.5.2. Apparatus and measurement                          |   |
| 1.5.3. Applications of coulometric methods                |   |
| 7. Radiochemical techniques .....                         | 3 hrs   |
| 8.1. Introduction   |   |
| 8.1.1. Radioactivity                                      |   |
| 8.1.2. Radioisotopes                                      |   |
| 8.1.3. Radioactive decay                                  |   |
| 8.1.4. Fate of different types of radiation               |   |
| 8.1.5. Radiation limits                                   |   |
| 8.1.6. Stability of radioactive compounds                 |   |
| 8.2. Measurement of radioactivity                         |   |
| 8.2.1. Ion collection method                              |   |
| 8.2.2. Scintillation technique                            |   |
| 8.3. Analytical applications of radioisotopes in pharmacy |   |
| <b>Total</b>  | <b>59 hrs</b>   |
| <b>Mode of Delivery</b>                                   | <ul style="list-style-type: none"> <li>▪ Lecture: 59</li> <li>▪ Tutorial: 10</li> </ul> |



|                           |   |
|---------------------------|---|
|                           | <ul style="list-style-type: none"> <li>▪ Seminars, assignments and Presentation: 10</li> <li>▪ Practical/ Laboratory: 36</li> <li>▪ Home study: 66</li> </ul>   |
| <b>Mode of Evaluation</b> | <ul style="list-style-type: none"> <li>▪ Assessment: 10</li> <li>▪ Seminar and assignments: 10%</li> <li>▪ Laboratory written exams and report writing: 10%</li> <li>▪ Practical exams: 15%</li> <li>▪ Quizzes: 15%</li> <li>▪ Tests (10%)</li> <li>▪ Final Exam: 40%</li> </ul>  |
| <b>Text Book</b>          | Beckett, A.H. and Stenlake, J.B. Practical Pharmaceutical Chemistry, Parts I & II, 4th edn., The Athlone Press, London, 1988.   |
| <b>Reference Books</b>    | <ol style="list-style-type: none"> <li>1. Connors, K.A. Textbook of Pharmaceutical Analysis, 3rd edition., 1982</li> <li>2. David G. Watson. Pharmaceutical Analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists, 2nd Edition, 2005, Elsevier.</li> <li>3. Gary D. Christian; Analytical chemistry, 6th edition, John Wiley and Sons INC., USA, 2004</li> <li>4. USP/NF (Latest edition). The United States Pharmacopoeial convention, Inc. Rockville, MD., USA</li> <li>5. British Pharmacopoeia (Latest edition), Her Majesty stationery office, London.</li> <li>6. David Harvey. Modern analytical chemistry. 1st ed, Mc Graw Hill, Boston, 2000</li> </ol> |

|                                       |   |
|---------------------------------------|---|
| <b>Module number</b>                  | <b>12</b>   |
| <b>Course Title</b>                   | <b>Pharmaceutical Analysis II</b>   |
| <b>Course Code</b>                    | <b>Phar 3122</b>  |
| <b>Course EtCTS<br/>(Course hour)</b> | <b>7 (189 hrs)</b>  |
| <b>Pre-requisite</b>                  | <b>Pharmaceutical Analysis I</b>  |
| <b>Co-requisite</b>                   | <b>none</b>   |
| <b>Course Description</b>             | The course deals with the applications of important instrumental analytical techniques such as spectro-chemical methods including UV- Visible, atomic absorption, flame spectroscopy, mass spectroscopy and nuclear magnetic resonance spectroscopy; chromatographic methods including Gas Chromatography and High Performance Liquid Chromatography in quality controls of pharmaceutical products. The course has 16 weeks of practical classes in which different instrumental analytical techniques will be studied as employed in the estimation of the constituents of drugs included in the national drug list |
| <b>Course Objectives</b>              | After completing this course, students will be able to understand the instrumentation of different modern instrumental analytical techniques and their use in pharmaceutical and biochemical analysis. They will also be able to propose suitable analytical technique for a sample, carry out analysis for different pharmaceuticals as well as handle, interpret and report data obtained from the analysis.  |

- Supporting objectives**
- Describe UV-Visible spectroscopy
  - Describe infrared spectroscopy
  - Describe fluorescence spectroscopy
  - Describe atomic spectroscopy
  - Describe mass spectroscopy
  - Identify different chromatographic techniques
  - Describe gas chromatography
  - Describe high performance liquid chromatography
  - Describe biological methods of analysis

### Course Content

- |   |        |
|---|--------|
| 1. UV- Visible spectrophotometry .....                                  | 10 hrs |
| 1.1. Introduction   |        |
| 1.2. Factors governing absorption of radiation in the UV/Visible region |        |
| 1.2.1. The concept of Chromophore and Auxochrome                        |        |
| 1.2.2. Absorption intensity shifts                                      |        |
| 1.2.3. Effect of pH on absorption                                       |        |
| 1.2.4. Conjugated dienes and Wood Ward and Fiesher's rule               |        |
| 1.3. Instrumentation  |        |
| 1.3.1. Radiation sources  |        |
| 1.3.2. Monochromators   |        |
| 1.3.3. Sampling cells and compartments                                  |        |
| 1.3.4. Detectors  |        |
| 1.3.5. Recording systems  |        |
| 1.3.6. Double and single beam instruments                               |        |
| 1.4. Qualitative spectrophotometry                                      |        |
| 1.5. Quantitative spectrophotometry                                     |        |
| 1.5.1. Beer's law and its limitations                                   |        |
| 1.5.2. Spectrophotometric titrations                                    |        |
| 1.6. Analysis of binary mixtures  |        |
| 1.7. Differential Spectrophotometry                                     | 2 hrs  |
| 1.8. Derivative spectra   |        |
| 1.9. Colorimetry  |        |
| 1.9.1. General requirements for colored substances                      |        |
| 1.9.2. Chemistry in colorimetry   |        |
| 1.10. Applications  |        |
| 2. Fluorescence spectrophotometry .....                                 | 7 hrs  |
| 2.1. Introduction   |        |
| 2.2. Instrumentation  |        |
| 2.3. Structural requirements of fluorescent compounds                   |        |
| 2.4. Factors affecting fluorescence intensity                           |        |

|   |       |
|---|-------|
| 2.5. Applications in pharmaceutical analysis  |       |
| 3. Infrared Spectrophotometry .....   |       |
| 3.1. Introduction   |       |
| 3.2. Instrumentation  |       |
| Dispersive, FTIR and NIR, Radiation sources, Monochromators, Photometer, Detectors, Recorders           |       |
| 3.3. Fundamental vibrations and factors affecting vibration frequency                                   |       |
| 3.4. Sample preparation   |       |
| 3.5. Scanning IR spectra.   | 5 hrs |
| 3.6. Interpretation of the spectra  |       |
| 3.7. Applications   |       |
| 3.7.1. IR spectrophotometry as a fingerprint technique  |       |
| 3.7.2. Quantitative IR analysis   |       |
| 3.7.3. IR spectrophotometry in structure elucidation  |       |
| 4. Atomic spectrophotometry .....   |       |
| 4.1. Introduction   | 2 hrs |
| 4.2. Types of atomic spectrophotometric techniques  |       |
| 4.2.1. Atomic absorption spectrophotometry (AAS)  |       |
| 4.2.2. Atomic emission spectrophotometry (AeS)  |       |
| 4.3. Instrumentation  |       |
| 4.4. Applications   |       |
| 5. Nephelometry and Turbidometry .....  | 2 hrs |
| 5.1. Introduction   |       |
| 5.2. Instrumentation  |       |
| 5.3. Pharmaceutical applications  |       |
| 6. Introduction to chromatography .....   | 2 hrs |
| 6.1. History and principles   |       |
| 6.2. Classifications  |       |
| 6.3. Definition of terminologies  |       |
| 7. Gas Chromatography (GC) .....  | 6 hrs |
| 7.1. Introduction   |       |
| 7.2. Instrumentation  |       |
| 7.3. Carrier gas cylinder, Injection port, Column and column oven, Detectors, Recorders and integrators |       |
| 7.4. Factors affecting choice of carrier gas  |       |
| 7.5. Temperature Programming in GC  |       |
| 7.6. Pyrolysis and derivatization in GC   |       |
| 7.7. Qualitative and quantitative analysis by GC  |       |
| 8. High performance liquid chromatography (HPLC) .....  | 8 hrs |
| 8.1. Introduction and theory  |       |

|   |       |
|---|-------|
| 8.2. Instrumentation  |       |
| Pump, Injection system, Column, Detectors, Data system                        |       |
| 8.3. Stationary and mobile phases   |       |
| 8.4. Structural factors governing rate of elution of compounds                |       |
| 8.5. Evaluation of column performance   |       |
| 8.6. Applications in:   |       |
| Identification, Quantitative analysis, Chiral separation                      |       |
| 9. Mass Spectrometry .....  | 5 hrs |
| 9.1. Introduction   |       |
| 9.2. Instrumentation  |       |
| 9.3. Molecular fragmentation patterns   |       |
| 9.4. GC-MS and LC-MS  |       |
| 9.5. Applications in pharmaceutical analysis                                  |       |
| 10. Nuclear magnetic resonance spectroscopy .....                             | 5 hrs |
| 10.1. Introduction to <sup>1</sup> H NMR and <sup>13</sup> C NMR spectroscopy |       |
| 10.2. Basic instrumentation.  |       |
| 10.3. Chemical shifts.  |       |
| 10.4. Shielding and deshielding effects.                                      |       |
| 10.5. Factors influencing chemical shifts.                                    |       |
| 10.6. Peak area and proton counting   |       |
| 10.7. Important tips for interpreting NMR spectra.                            |       |
| 11. Biological methods of analysis.....                                       | 4 hrs |
| 11.1. Introduction  |       |
| 11.2. Microbiological assay   |       |
| 11.3. Pyrogen testing (in vivo & in vitro)                                    |       |
| 11.4. Microbial limit test  |       |
| 11.5. Sterility test  |       |
| 11.6. Preservative efficacy test  |       |
| 12. Introduction to herbal drugs quality control                              | 2 hrs |
| 12.1. Introduction  |       |
| 12.2. Methods of herbal drugs quality control                                 |       |
| 12.3. Challenges in standardization of herbal drugs                           |       |

|              |               |
|--------------|---------------|
| <b>Total</b> | <b>5 8hrs</b> |
|--------------|---------------|

|                         |  |
|-------------------------|--|
| <b>Mode of Delivery</b> | <ul style="list-style-type: none"> <li>▪ Lecture: 58</li> <li>▪ Tutorial: 10</li> <li>▪ Seminars, assignments and Presentation: 10</li> <li>▪ Practical/ Laboratory: 36</li> </ul> |
|-------------------------|--|

|                           |   |
|---------------------------|---|
| <b>Mode of Evaluation</b> | <ul style="list-style-type: none"> <li>▪ Home study: 59</li> <li>▪ Assessment: 10</li> <li>▪ Visits to pharmaceutical firms and quality control laboratories: 6 hrs</li> <li>▪ Seminar and assignments: 10%</li> <li>▪ Laboratory written exams and report writing: 10%</li> <li>▪ Practical exams: 15%</li> <li>▪ Quizzes: 10%</li> <li>▪ Final Exam: 30%</li> <li>▪ Viva: 5%</li> <li>▪ Quality control visit report: 10%</li> </ul>  |
| <b>Text Book</b>          | <i>Beckett, A.H. and Stenlake, J.B. Practical Pharmaceutical Chemistry, Parts I &amp; II, 4th edn., The Athlone Press, London, 1988.</i>  |
| <b>Reference Books</b>    | <p>Connors, K.A. Textbook of Pharmaceutical Analysis, 3rd edition., 1982</p> <p>David G. Watson. Pharmaceutical Analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists, 2nd Edition, 2005, Elsevier.</p> <p>Gary D. Christian; Analytical chemistry, 6th edition, John Wiley and Sons INC., USA, 2004</p> <p>USP/NF (Latest edition). The United States Pharmacopoeial convention, Inc. Rockville, MD., USA</p> <p>British Pharmacopoeia (Latest edition), Her Majesty stationery office, London.</p> <p>David Harvey. Modern analytical chemistry. 1st ed, Mc Graw Hill, Boston, 2000.</p> <p>Francis Rouessac and Annick Rouessac, Chemical Analysis, Modern instrumental methods and techniques, 2nd ed, John Wiley and Sons, LTD, England, 2007.</p> <p>Satinder Ahuja and Michael W. Dong. Handbook of Pharmaceutical Analysis by HPLC. 1st ed, volume 6, Elsevier Academic Press, New York, 2005.</p> |

**Module 13: Pharmaceutical Technology Module****Module Name: Pharmaceutical Technology Module****Module Category: Core****Module Code: Phar-M3131****Module Number: 13****Module Weight: 10 ECTS****Courses:**

- Industrial Pharmacy (Phar3131) (7 ECTS)
- Immunological and Biological Products (Phar3132) (3 ECTS)

**Module Description**

The module covers preformulation, formulation, manufacturing and packaging of oral liquids, capsules, tablets, aerosols and sterile products (parenterals & ophthalmic); equipment and instruments used for production, quality control and the overall quality assurance and current good manufacturing practices. It also covers unit operations in pharmaceutical technology. Moreover, the module comprehends the role of genetic engineering and allied technologies that have underpinned the development of a range of pharmaceutical products of modern biotechnology, collectively termed biopharmaceuticals (mainly immunological and biological products) that can be used in the pharmaceutical care of a patient. The emphasis will be to

understand the application of recombinant DNA derived drugs (immunological and biological products) in pharmaceutical care of a patient. It also deals with handling of immunological and biological products and with the different therapeutic approaches such as gene therapy, antisense therapy, cell therapy and immunological principles (immunotechnology) that are used in prevention and diagnosis of diseases.

### **Module Objective**

This module aims to equip the student with theoretical and practical aspects of manufacturing of pharmaceuticals; the necessary skills required for processing dosage forms at industrial scale; and the fundamentals of quality assurance of pharmaceuticals and current good manufacturing practices. In addition, it aims to introduce the students with the role of biotechnology and allied technologies in the development of a range of pharmaceutical products of modern biotechnology, and application of recombinant DNA derived drugs (immunological and biological products) in pharmaceutical care of a patient.

### **Module Competency**

Upon a successful completion of this module/course, students will be capable of developing formulation and manufacture various pharmaceutical dosage forms (conventional and biopharmaceutical products) and evaluate their qualities.

**Module Mode of Delivery:** Block and parallel

### **Module Learning Teaching Method**

#### **Learning Activities**

- Active participation during class lectures
- Engage in learning by doing
- Laboratory group work

#### **Teaching Methods**

- The instructor is expected to introduce concepts and topics, and give references, facilitate discussions, ask questions, correct assignments

### **Time Allocation**

- Total time: 270hrs
- Lecture hours: 90 hrs
- Tutorial: 6 hrs



- Home study: 118 hrs
- Laboratory/demonstration and excursions: 36 hrs
- Presentation: 20 hrs

### **Module Assessment Technique**

#### **Formative and Summative assessments**

- Quizzes
- Report writing
- Seminar Presentations
- Assignments
- Final exam

### **Pharmaceutical Technology Module Syllabi**

**Module Number:** 13

**Course Title:** Industrial Pharmacy

**Course Code:** Phar3131

**Course EtCTS:** 7

**Course Hours:** 189

**Prerequisite:** Integrated Physical Pharmacy and Pharmaceutics I and II

**Co-requisite:** None

#### **Course Description**

This course covers the theoretical and practical considerations of pertinent unit operations in pharmacy, namely milling, mixing, drying, filtration, centrifugation, crystallization. It also addresses the manufacturing and packaging of oral liquids, capsules, conventional tablets, coated tablets, and sterile products (parenterals, ophthalmic, irrigating solutions). Equipment and machinery used for production, quality control and the overall quality assurance and good manufacturing aspects of these dosage forms are also discussed. The practical sessions include granulation and characterization, tablet pressing and assessing the qualities of the tablets.

#### **Course Objectives**

This course is expected to introduce to the student the pertinent unit operations employed in the production of dosage forms. On top of that it aims to equip the student with theoretical and practical aspects of manufacturing of pharmaceuticals; the necessary skills required for

processing dosage forms at industrial scale; and the fundamentals of quality assurance of pharmaceuticals and current good manufacturing practices.

## Course Contents

1. Unit operations
  - Size reduction (2 hrs)
    - Introduction (Definition and applications)
    - Mechanisms of size reduction
    - Equipments
  - Size separation (1 hr)
    - Introduction (definition and applications)
    - Size separation techniques
  - Mixing (3 hrs)
    - Introduction (definition and applications)
    - Fluid/semisolid/solid mixing
  - Drying (3 hrs)
    - Introduction
    - Drying of wet solids, mechanisms and equipment
    - Dryers for dilute solution and suspension
    - Freeze drying
  - Filtration and clarification (2 hrs)
    - Introduction (principles and applications)
    - Types and mechanism of filtration
    - Factors affecting the rate of filtration
    - Equipments
    - Centrifugation
  - Crystallization (1 hr)
    - Introduction (concepts)
    - Crystallization techniques
2. Tablets (12hrs)
  - Introduction (Rationale, quality attributes and classification)
  - Tablet formulation (API properties, excipients)
  - Tablet manufacturing by direct compression
  - Tablet manufacturing by granulation
  - Reasons for granulation, mechanisms of granule formation, methods of granulation, granulators, characterization

Tablet compression machines (types, basic parts and auxiliaries)

Stages of tablet formation

Problems in tableting and troubleshooting (capping and lamination, picking and sticking, mottling, chipping and friability, weight/content variation)

Quality evaluation (general appearance, thickness, hardness, friability, disintegration time, dissolution, weight variation, content uniformity)

3. Tablet Coating (3 hrs)

Tablet coating principles

Coating process and equipment

Sugar coating and film coating

Coating formula optimization

Quality control

4. Capsules (8hrs)

Hard Gelatin Capsules (5hrs)

Introduction

Raw materials for empty capsules

Empty capsule manufacturing

Formulation (powder formulation, excipients, semisolid, solid, liquid)

Formulation for filling properties, formulation for release of API, formulation for position release

Capsule Filling Machine: Filling Mechanism

Quality control of filled HGC

Storage, packaging and stability of HGC

Soft gelatin capsules (3 hrs)

Introduction (Description of the soft gel, Rationale for selection)

Capsule shell

Formulation (fill materials)

Manufacturing techniques

Quality control tests

5. Liquid Dosage Forms: Solutions and Coarse dispersions (5hrs)

- Solutions (2hrs)
  - Introduction
  - Formulation considerations (solvents and other excipients, stability)
  - Manufacturing processes: Equipments and machines, filling and packaging
  - Quality evaluations
- Suspension and Emulsion (3hrs)
  - Introduction (physical properties)
  - Formulation considerations, stability and preservation
  - Manufacturing processes: equipments and machines, filling and packaging
  - Quality evaluations
- 6. Sterile Products (6hrs)
  - Parenteral products
  - Types of parenterals
  - Product development, vehicles, solutes, containers
  - Production design facilities, steps in processing, packaging
  - Aseptic room & processing, quality control and quality assurance
  - Ophthalmic and other sterile preparations
- 7. Pharmaceutical Aerosols (6hrs)
  - Physicochemical principles of aerosol science and technology
  - Components of aerosols: propellants, containers, valve and actuator systems
  - Types of aerosol drug delivery systems
  - Product development, manufacturing and quality control of pharmaceutical aerosols
  - Recent developments in pharmaceutical aerosols
- 8. Modified Release Dosage Forms (6hrs)
  - Introduction: general mechanisms of drug release from dosage forms
  - Types of modified release dosage forms: controlled release, sustained release, delayed release, repeated release formulation
  - Design, development and characterization of modified release dosage forms
  - In vitro*/*In vivo* evaluation of modified release dosage forms
- 9. Current Good Manufacturing Practices (6hrs)
  - Building and facilities

Organization and personnel  
Material, packaging, labeling control  
Production & process controls  
Handling & distribution

### **Mode of Delivery**

- Illustrated lecture: 56 hrs
- Practical/Demonstration: 18hrs
- Excursion: 18hrs
- Tutorial: 8hrs
- Home Study: 54hrs
- Report writing: 10hrs
- Assignment: 15hrs
- Presentation: 10hrs

### **Mode of Assessment**

- Tests/quizzes: 25%
- Written exam for the practical session: 15%
- Assignments (Group and/or individual): 10%
- Laboratory and excursion reports: 10%
- Written final exam: 40%

### **Course Policies:**

- Students are expected to have 100% attendance and to read all reading assignments in advance
- Student should submit all group and/or individual assignments on due date
- Student should take all continuous assessments as scheduled
- Student should do his/her own work and actively participate during the presentation

### **References**

1. Unit Processes in Pharmacy, D. Ganderton, William Heinemann Medical Books Ltd., London, 1968.
2. Unit Operations in Chemical Engineering, W. L. McCabe and J. C. Smith, 3rd Ed., McGraw-Hill, Inc. USA, 1976.

3. The Science of Dosage Form Design, M. E. Aulton, 2nd Edition, Churchill Livingstone, UK, 2002.
4. The Theory and Practice of Industrial Pharmacy, L. Lachman, H. A. Liberman and J. L. Kanig, 3rd ed., Lea & Febiger, Philadelphia, 1986.
5. Bentley's Textbook of Pharmaceutics, Edited by E. A. Rawlins, 8th Edition, Bailliere Tindall, London, 1977.
6. Ansels Pharmaceutical Dosage Forms and Drug Delivery Systems (Paperback) by Loyd V., Jr. Allen, Nicholas G. Popovich, Howard C. Ansel, Loyd V. Allen, Publisher: Lippincott Williams & Wilkins; 8th edition , 2004
7. Modern Pharmaceutics by Gilbert S. Banker (Editor), Christopher T. Rhodes (Editor) 4th edition, 2002, Marcel Dekker
8. Merck Index: An Encyclopedia of Chemicals, Drugs, & Biologicals by Merck, Co, Maryadele J. Oneil (Editor), Ann Smith (Editor) 13th edition, 2001, Merck & Co
9. Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences by Alfred Martin, Pilar Bustamante, A.H.C. Chun (Illustrator) , 4th edition, 1993, Lea & Febiger
10. Handbook of Pharmaceutical Excipients by Arthur H. Kibbe (Editor), Ainley Wade, Paul J. Weller, 3rd edition Vol 3, 2000, Amer. Pharmaceutical Assoc.

### ***Immunological and Biological Products Syllabus***

**Module Number:** 13

**Course Title:** Immunological and Biological Products

**Course Code:** Phar3132

**Course EtCTS:** 3

**Course Hrs:** 81 hrs

**Prerequisite:** Biochemistry II and Microbiology, Immunology and Parasitology

**Co-requisite:** None

### **Course Description**

This course designed to introduce the student the application of biotechnology in drug discovery and development. This course comprehends the role of genetic engineering and allied technologies that have underpinned the development of a range of pharmaceutical products of modern biotechnology, collectively termed biopharmaceuticals (mainly immunological and biological products) that can be used in the pharmaceutical care of a patient. The emphasis will be to understand the application of recombinant DNA derived drugs (immunological and

biological products) in pharmaceutical care of a patient. It also deals with handling of immunological and biological products and with the different therapeutic approaches such as gene therapy, antisense therapy, cell therapy and immunological principles (immunotechnology) that are used in prevention and diagnosis of diseases.

### **Course Objectives**

This course is designed to introduce the students with the role of biotechnology and allied technologies in the development of a range of pharmaceutical products of modern biotechnology, and application of recombinant DNA derived drugs (immunological and biological products) in pharmaceutical care of a patient.

### **Course Contents**

1. Introduction to Biotechnology and Pharmaceutical Biotechnology (2hrs)
2. Introduction to genetic engineering/ rDNA technology (6hrs)
  - 2.1. Concepts in rDNA technology
  - 2.2. Tools of genetic engineering (enzymes, cloning vectors, cloning hosts)
  - 2.3. Basic techniques (gene cloning, protein expression)
  - 2.4. Application of rDNA technology
  - 2.5. Polymerase chain reaction (PCR) and other techniques of modern biotechnology
3. Immunological products and biological products (24hrs)
  - 3.1. General introduction (2hrs)
    - 3.1.1. Conventional Immunological and Biological products
    - 3.1.2. Biopharmaceuticals / Biologics/ or biotech drugs
  - 3.2. The different classes of immunological and biological products (20hrs)
    - 3.2.1. Immunological products (8hrs)
      - 3.2.1.1. Vaccines (definition, ideal properties, types, adjuvant and delivery systems prophylaxis application, handling (including transportation), storage and administration) (4hrs)
      - 3.2.1.2. Antibodies (polyclonal vs monoclonal antibodies (MAbs), hybridoma technology, mouse MAbs, humanized MAbs, MAb- drug conjugates,

- application of MAbs (therapeutic, prophylactic, diagnostic, targeted drug delivery, affinity chromatography) (4hrs)
- 3.2.2. Biological products (12hrs)
- 3.2.2.1. Cytokines (Interleukins, Interferones, Tumor necrosis factors, Hematopoietic growth factors) (4hrs)
- 3.2.2.2. Other growth factors (1hr)
- 3.2.2.3. Recombinant hormones (1hr)
- 3.2.2.4. Recombinant blood products (clotting factors, thrombolytic agents, anticoagulating agents) (1hr)
- 3.2.2.5. Therapeutic enzymes (1hr)
- 3.2.2.6. Nucleic acid based biological products (3hrs)
- 3.2.2.7. Gene based products (gene therapy, gene delivery systems) (1hr)
- 3.2.2.8. Antisense based products (antisense oligonucleotides, siRNAs, microRNAs, aptamers, peptide nucleic acids, ribozymes) (2hrs)
- 3.2.2.9. Introduction to cell based therapy (stem cell therapy, transplant rejection and cell encapsulation technology) (1hr)
- 3.3. Production, Formulation & Manufacturing, Handling and Dispensing of rDNA derived drugs (Biotech drugs) (2hrs)

#### **Mode of Delivery**

- Lecture and discussion: 26hrs
- Tutorial: 6hrs
- Home study: 31hrs
- Assignment: 10 hrs
- Presentations: 8 hrs

#### **Mode of Assessment**

- Tests: 20%
- quizzes: 15%
- Assignments: 15%
- Presentation: 10%,
- Final exam 40%

#### **Course Policies:**

- Students are expected to have 100% attendance and to read all reading assignments in advance



- Student should submit all group and/or individual assignments on due date
- Student should take all continuous assessments as scheduled
- Student should do his/her own work and actively participate during the presentation

## References

1. Zink G. L., Biological Products, In Remington's Pharmaceutical Sciences, 18<sup>th</sup> ed. Mack Publishing Co., Easton, 1990.
2. Arnold L. Demain, Julian E. Davies, Ronald M. Manuals of industrial microbiology and Biotechnology, 2nd ed. ASM press, Washington D.C.
3. Daan JA Crommelin and Robert D Sindelar: Pharmaceutical biotechnology: An introduction for Pharmacists and Pharmaceutical scientists. Harwood academic Publishers
4. Hugo, W. B. and Russell, A. D. Pharmaceutical Microbiology, 7<sup>th</sup> ed. 2004
5. S S Kori and M A Halakaia. Pharmaceutical biotechnology: Fundamentals and Applications. 2<sup>nd</sup> ed. 2005
6. B.D. Singh. Biotechnology. 2<sup>nd</sup> ed. Kallani Publishers. 2005
7. Internet

## Module 14: Social and administrative pharmacy module

**Module name:** Social and administrative pharmacy module

**Module category:** Core

**Module code:** Phar-M3141

**Module number:** 14

**Credit point value:** 17 ECTS

**Courses:** Health service management and policies (Com-H3141) (5 ECTS)

Introduction to pharmacoeconomics (Phar3142) (5 ECTS)

Medical supplies, equipments and reagents (Phar3143) (2 ECTS)

Drug supply management (Phar3144) (5 ECTS)

## Module description

Social and administrative pharmacy is designed for undergraduate pharmacy students aiming at cultivating students with the competence of actively participating in health care affairs of

population with the necessary pharmaceutical knowledge, skills & attitudes. It helps students to be able to ensure and manage the supply chains of pharmaceuticals (drugs, medical supplies, equipments and reagents) in the various health care settings. The module also equips students with appropriate health service and pharmaceutical management skills. Moreover, it equips students with the basics of cost and outcome analysis of drug therapy. It essentially enables prospective graduate pharmacists to competently involve in pharmacoeconomic decision making of drug treatments in communication with all the relevant parties. In addition, this module describes and introduces students with the concept of essential drugs, rational drug use and drug policy: need, development process, objectives and component strategies. The structure of the Ethiopian Health Care System and the National Drug Policy will also be dealt. It also sheds light on monitoring and evaluation of pharmaceutical programs as part of drug policy. It elaborates drug supply management cycle, namely, selection, quantification procurement, distribution, and rational use of pharmaceuticals. The module deals about effective ways of drug use information gathering to rule out drug use related problems. And finally the module also deals with Planning, implementation and evaluation of health activities.

**Module objective:**

After completion of this module students will be able to:

- Develop and apply knowledge of pharmacoeconomics for decision making.
- Describe the different types of medical supplies, equipments and reagents and their uses.
- Describe the concept of essential drugs, the national drug policy including the core objectives and key strategies.
- Discuss the importance of drug management in controlling costs and preventing morbidity and mortality.
- Explain the basic concepts in public health services management
- Explain the health care delivery system in Ethiopia

**Module competency:**

Upon a successful completion of this module, students will be able to

- Know the Ethiopian health care system and national drug policy
- Understand the basic concepts of essential drugs and manage the development of essential drug list, standard treatment guideline and national formulary

- Actively participate in managing the supply of medical supplies, equipment and reagents
- Describe components of drug management cycle
- Develop the knowledge and skills to communicate with patients, other health professions and colleagues
- Describe the different methods of pharmacoeconomic analysis and evaluate pharmacoeconomic studies , and effectively use them for decision making process
- Develop and demonstrate certain attitude and ethical values to deliver pharmaceutical services to the right patient at the right time in reasonable cost
- Demonstrate management skills to lead a health care program

**Module mode of delivery:** Block/Parallel

Totally required hours for the module:  $17 \times 27 = 459$ hrs

Lecture hours: 101hrs (25%)

Study hours: 122 hrs (30%)

Group work: 61 hrs (15%)

Project work: 20 hrs (5%)

Presentation(s): 41hrs (10%)

Tutorial: 20 hrs (5%)

Assessment: 41hrs (10%)

**Module assessment techniques:**

The assessment criteria are based on continuous assessment of class activities, individual and group assignment, report writing, test and final exams. This in turn can be broken down into;

Group/individual assignments: 15%

Presentation: 10%

Journal clubs.....10%

Tests/quizzes .....15%

Case studies ..... 10%

Final Exam.....40%

Total.....100%

## **Module learning and teaching methods**

### **A. Learning Activities**

Students are expected to undertake among others the following major learning activities:

- Engage in learning by doing (independent study, group assignments, presentation, report writing, etc...)
- Participation and note takings during class lectures and debates and discussions; Analysis, summarization and presentations of journals and cases studies

### **B. Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments, forming groups, encouraging students for peer learning
- Arrange and facilitate seminar sessions prepared by students

## **Teachers' and students' role**

### **Roles of Instructors**

The instructor will be expected to:

- Be a facilitator (introduce the subject; give guidance, moderate discussions, etc.)
- Read and comment assignments of students on time;
- Prepare his/her lessons and deliver lectures;
- Provide available and necessary reference materials;
- Encourage active participation of students in the teaching learning process;
- Assist students with learning difficulties;

### **Roles of Students**

Students are expected to:

- Engage in learning by doing (independent study, project work; group work, etc.)
- Be active learners (participate effectively in group assignments, make presentations, prepare and present seminars, write reports, etc.);
- Critically assess journal articles and related topics from book chapters.

1. Module Number in which the course exists: 14
2. Course title: Health Service Management And Policies
3. Course code: Com-H 3141

4. Course EtCTS: 5
5. Degree Program: Bachelor of pharmacy
6. Course team leader (co-coordinator) together with his/her name & full address: ..., P.O. Box.
7. Course instructor together with his/her name & full address.....
8. ECTS credits: 5 ECTS = 135 study hours
1. Target group: Year III/II
2. Course pre-requisite if any: None
3. Status of the course (compulsory/supportive/common/elective course): supportive
4. Course description: This course is designed to give the student a basic concept of public health services management. It begins by introducing the trainee to the lay and professional concept of health. It then goes on to deal with factors affecting health. It will also give students the knowledge about the relationship of health and development, health systems, Primary health care and health for all, definition and applicability to public health of subjects taught under public health, identifying community health problems, indicators of health status of a population, and major strategies of improving public health in developing countries
5. Specific course learning objectives:

Upon completion of this course, the student will be able to:

- Describe basic principles , concepts and methods in health management
- Demonstrate management skills so as to plan ,implement & evaluate effectively & efficiently PHC programs
- Identify planning decisions relating to objectives ,activities & resources
- List & relate functions of management dealing with the execution of activities, and the use of human and physical resources.
- Evaluate the different programs and components of services.
- Apply the basic principles involved in management of resources including drugs
- Establish and manage a working health tam
- Describe the organization and administration of health services in Ethiopia to correlate planning and management to the existing situation
- Describe what PHC is, its component and approaches so and to implement PHC activities to reach at social-health goals of the world

**Schedule of contact time, contents/topics & reading/reference materials for each topic**

| Week  | Contact hrs | Topic/sub-topic/chapter  | Reading materials      | Remark |
|-------|-------------|--|------------------------|--------|
| 1-2   | 6           | 1. General introduction <ul style="list-style-type: none"> <li>Distributing the course guide book/syllabus</li> <li>Introducing the course</li> </ul> Chapter 1: introduction to Health service management <ul style="list-style-type: none"> <li>Rationale for the course</li> <li>Definitions, principles and concepts of management</li> <li>Management and environment</li> <li>Types, skills and roles of managers</li> <li>Main functions of management</li> </ul> | Reference: 1,1         |        |
| 3-4   | 6           | Chapter 2: Health delivery system in Ethiopia <ul style="list-style-type: none"> <li>National health policy and drug policy</li> <li>Organization of Ministry of health</li> <li>National health plan</li> <li>Specific programs within the health service</li> </ul>  | Reference: 1           |        |
| 5 - 6 | 6           | chapter 3: Primary health care <ul style="list-style-type: none"> <li>Historical development</li> <li>The PHC approach</li> <li>PHC as part of socio-economic development</li> <li>PHC as level of health care</li> <li>PHC strategies</li> <li>Essential components of PHC</li> </ul>   | Reference: 1,4,5       |        |
| 7-8   | 6           | Chapter 4: Health planning <ul style="list-style-type: none"> <li>- General overview</li> <li>- Steps in planning <ul style="list-style-type: none"> <li>situation analysis</li> <li>identifying and selecting priority problems</li> <li>setting objectives and targets</li> <li>setting strategies, review obstacles and limitation</li> <li>prepare action plan</li> </ul> </li> </ul>  | Reference: 1,2,4,4.6,7 |        |
| 9-11  | 6           | Chapter 5: Implementation <ul style="list-style-type: none"> <li>principles of organization</li> <li>organizational structure</li> <li>coordination</li> <li>Monitoring and control</li> <li>Supervision</li> </ul>  | Reference: 1,2,3       |        |

|  |   |  |                    |
|--|---|--|--------------------|
| 12-13  | 6 | Chapter 6: Evaluation  | Reference: 1,2,4,5 |
|  |   | <ul style="list-style-type: none"> <li>• Effectiveness</li> <li>• Efficiency <ul style="list-style-type: none"> <li>○ How to evaluate work progress monitoring</li> <li>○ Appraising staff performance</li> <li>○ Evaluating use of resources</li> </ul> </li> </ul> |                    |
| 14   | 6 | Chapter 7: Managing a health team  | Reference: 1,1     |
|  |   | <ul style="list-style-type: none"> <li>• what a health team means</li> <li>• how to lead a health team</li> <li>• organizing a health team</li> <li>• controlling and assessing the work</li> </ul>  |                    |
| 15-16  | 6 | Chapter 8: Managing resources  | Reference: 1, 2,   |
| 6. Delivery mode/methodology:  |   |  |                    |
|  |   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Active learning methods (brain storming, buzz group, discussion, group and individual presentation, assignment etc),</li> </ul>  |                    |
| 7. Assessment mechanisms:  |   |  |                    |
|  |   | <ul style="list-style-type: none"> <li>• Quizzes: 15%</li> <li>• Assignment: 15%</li> <li>• Tests-15%%</li> <li>• Seminar presentations:10%</li> <li>• Project work: 15%</li> <li>• Final written exam-30%</li> </ul>  |                    |
| 8. Final exam date: At the end of the semester the course is delivered |   |  |                    |
| 9. Course policies:  |   |  |                    |
|  |   | <ul style="list-style-type: none"> <li>• Lecture is mandatory</li> <li>• Student should submit assignments on due date</li> </ul>  |                    |

- Student should take all continuous assessments as scheduled. If he/she misses quiz or assignment, no make-up will be arranged for her/him.
- Student should do his/her own work. If he/she is caught red-handed while cheating, he/she will get zero for that particular work

## 10. References

### Text Book

1. On Being In charge - A Guide for Middle - Level Management in PHC, WHO, Geneva, 1980.1992.

### Other References

1. Challi Jira, Amsalu Feleke, Getnet Mitike (2003) Health Science Management for Health Science Students. Lecture Note Series. Jimma University: JU.
2. MOH (1993), Health Policy of Transitional Government of Ethiopia, Addis Ababa.
3. Health and Health Related indicators, By the Federal Ministry Of Health ,
4. WHO “Health For All” series 1-7. WHO Geneva.
5. Review of PHC (National). 1985
6. Alma Ata Declaration. WHO/UNICEF, 1978.
7. 20 Year health sector plan (HSDP).

## **Introduction to Pharmacoeconomics Course Syllabus**

**Course title: Introduction to Pharmacoeconomics**

**Course code:** Phar 3142

**Course EtCTS:** 5

**Course Hours:** 135hours (5 EtCTS x 27)

- Lecture: 48
- Project work: 14 hours
- Presentations=14
- Tutorial: 13 hours



- Home study: 36 hours
- Assessment=10 hours

Pre-requisite if any: Successful completion of the previous modules

### **Course Description:**

- This introductory course in pharmacoeconomics is designed to prepare graduate pharmacists who can competently involve in pharmacoeconomic decision making. Students will be able to describe and use different methods of pharmacoeconomic evaluation and effectively analyze and evaluate different pharmacoeconomic studies. This course also introduces students with the basic concepts in economics.

### **Course Objective:**

- After completion of this course students will be able to describe the different methods of pharmacoeconomic analysis and evaluate pharmacoeconomic studies and effectively use them for decision making.

Supporting objectives: To meet this objective, students will:

- ❖ Define economics
- ❖ List the different principles of economics
- ❖ Explain Demand, Supply and Equilibrium
- ❖ Define pharmacoeconomics
- ❖ Identify measures of direct and indirect costs based on data on charges, expenditures, and treatment algorithms
- ❖ Determine and use standard costs in economic evaluations.
- ❖ Discount costs and benefits appropriately.
- ❖ Describe pharmacoeconomics analytical models.
- ❖ Discuss the importance of specification/selection of perspectives to be included in the analysis.
- ❖ Identify the strengths and weaknesses of different evaluation designs(cost-effectiveness/cost-utility/costbenefit/costminimization).
- ❖ Identify measures of outcomes and understand the appropriate use of HRQOL, QALY, and utility measures.
- ❖ Discuss the difference between efficacy and effectiveness data.

- ❖ Discuss the implications of choice of endpoints for the analysis, including the use of (a) intermediate outcomes measures, (b) utilities and quality of life measures, (c) projected final outcomes based on trial data, and (d) summary of findings by meta-analysis.
- ❖ Understand sensitivity analysis, including choice of variables and one- and two-way analysis.
- ❖ Critique current Pharmacoeconomics literature.
- ❖ Describe the rationale and importance of pharmacoeconomic (PE) analyses.

| Week | Contact<br>hrs | Topic/sub-topic/chapter  | Reading<br>materials | Remarks |
|------|----------------|--|----------------------|---------|
| 1    | 4              | 1. Introduction to Principles of Economics<br>1.1 Definition of economics and economy, value, worth and utility;   | Reference 1,2 & 3    |         |
| 2    | 4              | 1.2 Demand, Supply and Equilibrium;  | Reference 1,2 & 3    |         |
| 3    | 4              | 1.3 The market: Setting a price, Free and Regulated Markets, Market Failure<br>1.4 Society and Scarce Resources  | Reference 1,2 & 3    |         |
| 4    | 4              | 2. Introduction to Pharmacoeconomics<br>2.1 Definition and Importance of Pharmacoeconomic studies<br>2.2 Introduction to pharmacoeconomic analysis<br>2.3 Health Care and Market Failure     | Reference 1,2 & 4    |         |
| 5    | 4              | 3. Decision Analysis and Pharmacoeconomic Evaluations<br>3.1. Basic Concepts of Probability<br>3.2. Definition and Theoretical Basis of Decision Analysis in Health                          | Reference 1,2 & 3    |         |
| 6    | 4              | 3.3 The Basic Steps of Decision Analysis<br>3.4 Evaluation of the Result of Decision Analysis  | Reference 1,2 & 3    |         |
| 7    | 4              | 3.5 Possible Benefits and Common Criticisms of Decision Analysis in Health<br>4. Costs and Time Preference.<br>4.1. Types of Intervention Cost Studies<br>4.2. Collection and Types of Costs | Reference 1,2 & 3    |         |

|    |   |  |                   |
|----|---|--|-------------------|
| 8  | 4 | 4.3 Discounting of Costs<br>4.4 Adjusting for Inflation and Annuitizing<br>Capital Expenditures                | Reference 1,2 & 3 |
| 9  | 4 | 5. Cost Benefit Analysis (6hrs)<br>5.1. Introduction to CBA<br>5.2. Steps in Conducting CBA                    | Reference 1,2 & 3 |
| 10 | 4 | 5.3 Group discussions and Exercises about CBA<br>6. Cost Effectiveness Analysis<br>6.1. Introduction to CEA    | Reference 1,2 & 3 |
| 11 | 4 | 6.2 Principles of CEA<br>6.3 Conducting CEA  | Reference 1,2 & 3 |
| 12 | 4 | 6.4 Group Discussions and Exercises about CEA<br>7. Cost Utility Analysis<br>7.1. Introduction to CUA          | Reference 1,2 & 3 |
| 13 | 4 | 7.2. QALY and DALY<br>7.3. Measuring QALY and DALY   | Reference 1,2 & 3 |
| 14 | 4 | 7.4 Conducting Cost Utility Analysis<br>8. Miscellaneous Topics<br>8.1. Markov Models of Chronic Conditions    | Reference 1,2 & 3 |
| 15 | 4 | 8.2. Screening and Pharmacoeconomics<br>8.3. Assessing Articles and Critique of<br>Pharmacoeconomic Evaluation | Reference 1,2 & 3 |
| 16 | 4 | WHOLE COURSE SUMMARY   |                   |

**Mode of delivery:**

This course is thought using a variety of instructional methods including

- Illustrated Lectures and case studies
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments
- Presentations and participation in class discussion

**Mode of Assessment:**

Continuous assessment & summative assessment

- quizzes: 15%

- Test:15%
- journal club presentation:10%Case studies:10%
- Assignments (group or individual):15%
- Written final exam: 35%

#### LEARNING MATERIALS:

- Recommended Readings:
  1. Bootman JL, Townsend RJ, McGhan WF (2002). Principles of Pharmacoeconomics, 2<sup>nd</sup> ed. or later edition, Harvey Whitney Books Company, United States of America.
  2. Haddix AC, Teutsch SM, Shaffer PA, Dunet DO (1996 or later edition). Prevention Effectiveness: A Guide to Decision Analysis and Economic Evaluation, Oxford University Press Inc, New York.
  3. Drummond MF, Bernie O, Stoddard GL, Torrance GW (1997). Methods for the Economic Evaluation of Health Care Programs, 2<sup>nd</sup> ed. or latter edition, Oxford University Press Inc, New York.
  4. On line Lecture Notes – the Economics of Health Care: <http://www.oheschools.org/> produced by the UK Office of Health Economics.

## Medical Supplies, Equipment's & Reagents Course Syllabus

**Course title: Medical Supplies, Equipments & Reagents**

**Course code: Phar 3143**

**Course EtCTS: 2**

ECTS credits: 54 Study hours

- Lecture:16

- Project work: 6 hours
- Presentations=7 hours
- Tutorial: 6 hours
- Home study: 13 hours
- Assessment=6

Pre-requisite if any: - Successful completion of previous modules

*Course Description:*

- This introductory course is designed to prepare graduate pharmacists who can competently involve in managing the supply of medical supplies, equipment and reagents. Students will be able to differentiate between the different classes of medical supplies and equipment. This course also introduces students with the basic types of diagnostic drugs and reagents. This in turn helps the trainees for ease selection, quantification and procurement of different classes of medical supplies, equipments and reagents which are required by the health establishment or academic institution they shall join.

*Course objectives:*

After completion of this course students will be able to:

- Identify the different types of Medical Supplies and Equipments commonly used at different settings
- Describe how these Medical Supplies and Equipments function and used.
- Explain how these Medical Supplies and Equipments should be handled, transported and stored safely.
- Identify the different types of Diagnostic Supplies and Reagents
- Describe how these Diagnostic Supplies and Reagents are clinically applied or used.
- Identify the common Medical Supplies and Equipments used in Veterinary Medicine.

| Week | Contact hrs | Topic/sub-topic/chapter   | Reading materials | Remark |
|------|-------------|---|-------------------|--------|
| 1    | 1.5         | 1. Medical Supplies and Equipment (10hr<br>1.1. Definition of Terms (Medical Supplies, Medical Equipment or Instrument, Reagents) | Reference 1&2     |        |

|    |     |  |               |
|----|-----|--|---------------|
| 2  | 1.5 | 1.2. Surgical Dressings (Fibres, Fabrics, Bandages, Self -adhesive plasters, Compound dressings etc.)  | Reference 1&2 |
| 3  | 1.5 | 1.3 Sutures and Ligatures (absorbable sutures, non-absorbable sutures, surgical needles etc.)  | Reference 1&2 |
| 4  | 1.5 | 1.4 Medicinal Gases (classifications, uses & applications, Safety precaution, and different components, etc.   | Reference 1&2 |
| 5  | 1.5 | 1.5 Other Medical Supplies (Needles and syringes, Gloves, Masks, Surgical blades, Scissors, Forceps, Catheter, Nasogastric tubes, Endotracheal tubes, rectal tubes). | Reference 1&2 |
| 6  | 1.5 | 1.6 Equipments Used in Surgery, Anesthesia, Orthopedics, Ophthalmology, Dentistry, ENT.  | Reference 1&2 |
| 7  | 1.5 | 1.6 Equipments Used in Surgery, Anesthesia, Orthopedics, Ophthalmology, Dentistry, ENT.....  | Reference 1&2 |
| 8  | 1.5 | 1.7 Infection Control, Sterilization and Care of Surgical Instruments  | Reference 1&2 |
| 9  | 1.5 | 2. Diagnostic Supplies and Reagents (4hrs)   | Reference 1&2 |
| 10 | 1.5 | 2.1. Different Diagnostic Supplies<br>(laryngoscope, otoscope, thermometers, sphygmomanometers, glucometers, X-ray supplies, microscope, stethoscope, etc.           | Reference 1&2 |
| 11 | 1.5 | 2.1. Diagnostic Imaging Drugs (X-ray contrast agents, Magnetic resonance contrast agents, Ultrasound contrast agents, etc.)  | Reference 1&2 |
| 12 | 1.5 | 2.1 Non-Imaging In-Vivo Diagnostic Drugs   | Reference 1&2 |

|    |     |  |               |
|----|-----|--|---------------|
|    |     | (Cardiovascular System, Endocrine System, GIT, Lymphatic System, Reproductive System, Ophthalmic, Urinary Tract, Miscellaneous Skin Antigen Tests, etc.)   |               |
| 13 | 1.5 | 2.1. Reagents Used in the Medical Laboratory (mycobacterium testing (AFB), pregnancy tests, enteric fever tests, uric acid tests, blood grouping tests, VDRL tests, HIV tests, clinical chemistry test, etc. | Reference 1&2 |
| 14 | 1.5 | 2.2. Self-Care Diagnostic Devices  | Reference 1&2 |
| 15 | 1.5 | 3. Medical Supplies and Equipments used in Veterinary Medicine (2hrs)  | Reference 3   |
|    |     | 3.1. Peculiar characteristics of Supplies Used in Veterinary Medicine  |               |
| 16 | 1.5 | 3.2. Equipments Used for Oral Administration of Drugs  | Reference 3   |
|    |     | 3.3. Equipments Used for Intravenous Administration  |               |
|    |     | 3.4. Materials Used for Administration of Topical Medication   |               |

### **Mode of delivery**

This course is thought using a variety of instructional methods including

- Illustrated Lectures
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments
- Presentations and participation in class discussion
- Demonstration and visit

### **Assessment mechanisms**

Continuous assessment & summative assessment

- Assignments: 10%
- Quizzes: 10%
- Presentations: 10%
- Test: 15%
- Visits and report: 15%
- Final exam: 40%

*Books recommended:*

1. Troy BD (ed) (2006). Remington: The Science and Practice of Pharmacy, 21<sup>st</sup> ed, Lippincott Williams and Wilkins, Philadelphia
2. Kapur MM (2005). A Complete Hospital Manual of Instruments and Procedures, Jaypee Brothers Medical Publishers Ltd, New Delhi
3. Wanamaker BP, Pettes CL (2000). Applied Pharmacology for the Veterinary Technician, 2<sup>nd</sup> ed., W.B. Saunders Company, USA.

## **DRUG SUPPLY MANAGEMENT COURSE SYLLABUS**

**Course title: Drug Supply Management**

**Course code: Phar 3144**

**Course EtCTS: 5**

Course ECTS credits: 5 ECTS = 135 study hours

- Lecture= 48
- Assignment= 10 hours



- Presentations=14
- Tutorial= 13 hours
- Home study= 36 hours
- Hospital pharmacy visit= 4 hrs
- Assessment=10 hours

Pre-requisite if any: Health Service Management and Policies

Course Description:

- The drug supply management course introduces students with the concept of essential drugs, drug policy, and rational drug use and tools to investigate use of medicines. It also gives an insight on functions of drug supply management cycle, namely, selection, quantification, procurement, distribution, and rational use. Furthermore, accounting principles, as well as marketing and sales management principles and techniques will be introduced.

Course Objective:

- After completion of this course, students will be able to describe the concept of essential drugs, the national drug policy including the core objectives and key strategies, drug management cycle, the tools used to investigate drug use, the principles of accounting, principles of marketing pharmaceutical products and the sales management techniques, and also the monitoring and evaluation of whole activity.

Supporting objectives:

To meet this objective, students will:

- Describe the role of drugs and drug products in the diagnosis, treatment and prevention of diseases.
- Discuss what national drug policy is and answer why countries need to have a drug policy.
- Describe the principles of drug supply management system including selection, quantification procurement, distribution and usage at health facility or national level.
- Adopt methods of community drug needs assessment and drug use evaluation.
- Adopt good storage practice and standard operating procedures for drug management at health facilities.
- Prepare list of essential drugs and supplies at health facilities or national level.
- Perform estimation (forecasting) of the quantities of drugs and supplies needed.
- Perform drug use pattern assessments at health facilities using WHO/INRUD indicators
- Practice appropriate documentation and reporting of drugs on stock, expired drugs and drug consumption and related activities to appropriate persons and/or organizations.
- Demonstrate how to dispose expired and other unfit-for-use products based on national guideline
- Identify challenges for drug supply management.
- Explain drug selection, its rationale, and criteria for drug selection.

- Describe drug storage and stock management, stock rotation medical stock security and importance of stock management.
- Describe rational drug use: promotion of rational prescribing, dispensing and use by patients.
- Discuss about managing, monitoring and evaluation of equipments and medical supplies usage.
- Assume responsibility and accountability for wastage (damage or expiry) of medicines or supplies resulting from negligence.
- Explain what an accounting mean,
- Discuss why accounting is said to be the language of business
- Go through and accomplish the accounting cycle

| Week | Contact hrs | Topic/sub-topic/chapter   | Reading materials                  | Remark |
|------|-------------|---|------------------------------------|--------|
| 1    | 4           | 1.Introduction <ul style="list-style-type: none"> <li>▪ Overview of the course</li> </ul> 2. Concept of Essential Drugs and National Drug Policy  | Reference 1 & 4<br>Reference 1 & 9 |        |
| 2    | 4           | 2.1 Concept of essential drugs<br>2.2 The formulary process<br>2.3 Definition of NDP<br>2.4 Objectives and key strategies of NDP<br>2.5 How to develop the NDP?                         | Reference 1,2,3,4,5, 6 & 11        |        |
| 3    | 4           | 3. Drug management cycle<br>3.1 Selection of Drug   | Reference 1,4 ,12& 15              |        |
| 4    | 4           | 3.2 Quantification Methods  | Reference 1,4,10 &15               |        |
| 5    | 4           | 3.2 Procurement Process<br>3.2.1 Managing procurement   | Reference 1,4 & 15                 |        |
| 6    | 4           | 3.2.2 Inventory management  | Reference 1,4 &15                  |        |
| 7    | 4           | 3.2.3 QA for drug procurement<br>3.3 Distribution System<br>3.3.1 Managing distribution<br>3.3.2 Good storage practices   | Reference 1,4,13,14 & 15           |        |
| 8    | 4           | 3.4 Drug Use<br>3.4.1 Rational drug use<br>3.4.2 Types of irrational drug use<br>3.4.3 Factors contributing to irrational drug use<br>Strategies for the promotion of rational drug use | Reference 1,4,13,14 &15            |        |
| 9    | 4           | 4. Tools to investigate the use of medicines<br>4.1 Stepwise approach to investigate the use of medicines<br>4.2 WHO/INRUD Drug Use Indicators  | Reference 1,4,8,13,14 &15          |        |
| 10   | 4           | 4.3 Qualitative methods to investigate problems of drug use   |                                    |        |
| 11   | 4           | 5 Drug management information system<br>6 Monitoring and evaluation   | Reference 1,4,13,14 &15            |        |

|    |   |   |                    |
|----|---|---|--------------------|
| 12 | 4 | 7 Accounting principles<br>7.1 Introduction to accounting (definition of accounting; need for accounting; general accepted accounting principles; accounting planning and budgeting; users of accounting data). | Reference 16,17&18 |
| 13 | 4 | 7.2 Developing an accounting system (the accounting equation; maintaining journals and ledgers; financial statements; the accounting cycle).  | Reference 16,17&19 |
| 14 | 4 | 7.3 Interpretation of financial statements (comparative financial statement analysis; analysis used by creditors; solvency; efficiency; long-term financial condition; auditing).                               | Reference 16,17&19 |
| 15 | 4 | 8 Pharmaceutical Marketing<br>8.1 Principles of marketing pharmaceutical products and the sales management techniques<br>8.1.1 The manufacturer's perspective,  | References 1 & 15  |
| 16 | 4 | 8.1.2 Market research, pricing and competition approaches.<br>8.1.3 Advertising, detailing and other forms of sales promotion<br>8.1.4 The administration of the marketing and sales staff.                     | References 1& 15   |

### **Delivery mode/methodology:**

This course is thought using a variety of instructional methods including

- Illustrated Lectures and case studies
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments
- Presentations and participation in class discussion
- Hospital pharmacy visit

### **Assessment mechanisms:**

Continuous assessment & summative assessment

- Assignments: 15%
- Presentations: 10%
- Quizzes: 15%
- Test: 20%
- Final exam: 40%

## LEARNING MATERIALS:

- Recommended Readings:
  1. Management sciences for Health (1997) managing drug supply. Second Edition, revised and expanded, Kumar press, West Hartford, Conn., USA.
  2. Ministry of Health of Ethiopia (1997). The National Drug Policy of the transitional government of Ethiopia, Addis Ababa, Ethiopia.
  3. Holloway K. (ed.) and Terry Green (2003). Drug and Therapeutics Committees. WHO/MSH.
  4. Federal Ministry of Health of Ethiopia (1996). Manual on Drug Supply Management, Prepared by Drug Administration and control Department, Addis Ababa, Ethiopia
  5. WHO (1988) .Guidelines for Developing National Drug Policies, WHO, Geneva, Switzerland.
  6. WHO (2001). How to develop and implement a national drug policy. Second edition. Geneva, Switzerland.
  7. Smith, H.A. (2003). Principles and Methods of Pharmacy Management, 2<sup>nd</sup> ed. Lea & Febiger, Philadelphia, 1980.
  8. Hardon A., Hodgkin C., and Fresle D. (2004). How to investigate the use of medicines by consumers, WHO/University of Amsterdam/Royal Tropical Institute.
  9. WHO (1997). The use of Essential Drugs: Seventh Report of the WHO Expert Committee (including the revised Model List of Essential Drugs), TRS 867, WHO, Geneva, Switzerland.
  10. WHO (1988). Estimating Drug Requirements, a practical Manual, WHO/DAP/88.2
  11. WHO (1994). Indicators for Monitoring National Drug policies, a Practical Manual, WHO/DAP/94.12, WHO Geneva, Switzerland.
  12. WHO (1990) Management of Drugs at Health Facilities, WHO/DAP/90.10 WHO, Geneva, Switzerland.
  13. WHO (1997). Public-private Roles in the Pharmaceutical sector. Implications for equitable Access and Rational Drug use. Health Economics and Drugs, DAP series N. 5, WHO/DAP/97.12, WHO, Geneva, Switzerland.
  14. WHO (1997).The role of the pharmacist in the Health care system; WHO/Parma/97/599, WHO, Geneva, Switzerland.
  15. Troy BD (ed) (2006). Remington: The Science and Practice of Pharmacy, 21<sup>st</sup> ed, Lippincott Williams and Wilkins, Philadelphia.
  16. Fess and Warren. Accounting Principles. South-Western Publishing Co., 16<sup>th</sup>.
  17. Kermit D. Larsen: Fundamental Accounting Principles: 12<sup>th</sup> ed.; Richard Irwin Inc., 1990.
  18. Hermanson, Edwards and Salmon son: Accounting Principles, 4<sup>th</sup>-7<sup>th</sup> ed. Richard D. Irwin Inc.1989.
  19. Needles, Belverd E. Jr., Henry R. Anderson, James C. Caldwell, and Sherry K. Mills. Principles of Accounting. Houghton Mifflin Company.

## Module 15: Biopharmaceutics and Clinical Pharmacokinetics Module

**Module Name:** Biopharmaceutics and Clinical Pharmacokinetics Modules

**Module Category:** Core

**Module Code:** Phar-M3151

**Module Number:** 15

**Module Weight:** 7 ECTS

**Course:**

- Biopharmaceutics and clinical pharmacokinetics (Phar3151) (7 ECTS)

**Module Description**

This module deals with mechanisms of drug absorption, effect of pH on drug absorption and the pH partition principle, role of dosage forms in the absorption of drugs, bioavailability and bioequivalence, factors affecting bioavailability, and evaluation of the bioavailability of a drug. It also deals with the pharmacokinetics aspect of drug molecules i.e. how drugs are absorbed, distributed, metabolized and eliminated in the body. This is essential for pharmacists to provide patients the appropriate drug regimen that will reduce the chance of under-treatment, inadvertent poisoning, and dose related adverse effects.

**Module Objective:**

- To develop the ability to logically apply the interrelationship of the physicochemical properties of the drug, the dosage form in which the drug is given and the route of administration on the rate and extent of drug absorption.
- To develop a graduate with good practical knowledge and understanding of pharmacokinetics and the ability to logically apply relatively simple pharmacokinetic principles in everyday clinical pharmacy practice.

**Module Competency**

After completion of this module the students will be able to use the principle of pharmacokinetics in dose adjustment, therapeutic drug monitoring and decision making with regard to rational drug use.

**Module Mode of Delivery:** Block**Module Learning Teaching Method****Learning Activities**

- Engage in learning by doing (independent study, group assignments, presentation, report, writing, and etc...)
- Participation and note takings during class lectures and debates and discussions;
- Analysis, summarization and presentations of chapter/article, scientific reports (and be able present or submit in a concise and summarized form)
- Liver and kidney function data collection, interpretation, identifying appropriate formula and accordingly adjust the dose for that patient

**Teaching Methods**

- The course facilitator is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments,
- Arrange and facilitate seminar sessions by inviting other health care professionals for public lectures.
- Inform the physician and nurse utilize the already adjusted dose and r calculated loading dose to their client.

**Time Allocation**

Total hours: 189 hrs

- Lecture hours: 52 hrs
- Tutorial: 12 hrs
- Case Study and Presentation: 20hrs
- Home study: 105 hrs

**Module Assessment Techniques**

- Group assignments
- Case study presentation
- Tests/quizzes
- Final Exam

**Biopharmaceutics and Pharmacokinetics Module Course Syllabus**

**Module Number:** 15

**Course Title:** Biopharmaceutics and Clinical Pharmacokinetics

**Course Code:** Phar 3151

**Course EtCTS:** 7

**Course Hours:** 189 hrs

**Prerequisite:** Physiology II and Pharmacology II

**Co-requisite:** None

***Course Description***

This module deals with mechanisms of drug absorption, effect of pH on drug absorption and the pH partition principle, role of dosage forms in the absorption of drugs, bioavailability and bioequivalence, factors affecting bioavailability, and evaluation of the bioavailability of a drug.

It also deals with the pharmacokinetics aspect of drug molecules i.e. how drugs are absorbed, distributed, metabolized and eliminated in the body. This is essential for pharmacists to provide patients the appropriate drug regimen that will reduce the chance of under-treatment, inadvertent poisoning, and dose related adverse effects.

### **Course Objective**

- To develop the ability to logically apply the interrelationship of the physicochemical properties of the drug, the dosage form in which the drug is given and the route of administration on the rate and extent of drug absorption.
- To develop a graduate with good practical knowledge and understanding of pharmacokinetics and the ability to logically apply relatively simple pharmacokinetic principles in everyday clinical pharmacy practice.

### **Course Content**

#### **Part I Biopharmaceutics**

##### **1. Introduction (4hrs)**

1.1 Definitions, concepts and applications

1.2 Barriers of drug transport (epithelia and plasma membrane)

1.3 Mechanisms of drug transport (Paracellular and transcellular routes, passive diffusion, carrier-mediated transport (Active transport, facilitated diffusion), vesicular transport)

##### **2. Factors affecting oral drug absorption (10 hrs)**

2.1 GIT anatomy and physiology (1hr)

2.2 Physiologic factors (blood flow, GIT motility; emptying and transit times, gastrointestinal pH, pre-systemic metabolism, Stability in the GIT, other drugs, effect of food, disease states) (3 hrs)

2.3 Physiochemical factors (Drug dissolution and Noyes-Whitney equation, particle size and surface area, crystal forms, salt formation,  $P^{K_a}$  and  $P^H$ , lipid solubility, pH-partition hypothesis) (3hrs)

2.4 Formulation factors (Drug release from Solution, suspension, capsules and tablets; effects of excipients) (3hrs)

##### **3. Drug absorption from other routes of administration (6 hrs)**

- 3.1 Percutaneous drug absorption ( anatomy & physiology, process of absorption, factors influencing absorption)
- 3.2 Parenteral drug absorption (Intramuscular, Subcutaneous, Intradermal) ( Anatomy & physiology, Process of absorption, Factors influencing absorption)
- 3.3 Rectal drug absorption (anatomy & physiology, process of absorption, factors influencing absorption)
- 3.4 Vaginal drug absorption (anatomy & physiology, process of absorption, factors influencing absorption)
- 3.5 Pulmonary drug absorption (anatomy & physiology, process of absorption, Factors influencing absorption)
- 3.6 Nasal drug absorption (Anatomy & physiology, process of absorption, factors influencing absorption)
- 3.7 Ophthalmic drug absorption (Anatomy & physiology, Process of absorption, Factors influencing absorption)
4. Bioavailability and Bioequivalence (5 hrs)
  - 4.1 Introduction and terminologies
  - 4.2 types of bioavailability (absolute, relative)
  - 4.3 Methods of Assessing Bioavailability (*in vivo* methods, *in vitro* methods)
  - 4.4 *In Vitro/ in Vivo* Correlations and Biopharmaceutical classification Scheme
  - 4.5 Bioequivalence studies

## **Part II: Clinical pharmacokinetics**

1. Introduction (2 hrs)
  - 1.1 Definitions, applications and types of pharmacokinetics
  - 1.2 Pharmacokinetic and Pharmacodynamic relationships
2. Basic pharmacokinetics (18 hrs)
  - 2.1 Order and rate constants (1 hrs)
  - 2.2 Pharmacokinetic models (2 hrs)
    - 2.2.1 Compartmental models
    - 2.2.2 Physiologic (perfusion models)
    - 2.2.3 Model independent methods (statistical moment theory)



- 2.3 Non-linear pharmacokinetics (1 hr)
- 2.4 Drug distribution (Tissue permeability, distribution co-efficient, binding of drugs ,volume of distribution) (2 hrs)
- 2.5 Drug elimination (drug metabolism, renal and extra-renal excretion, concept of clearance) (2 hrs)
- 2.6 Pharmacokinetics of IV bolus injection (plasma conc. vs time profile, determination of kinetic parameters) (2 hrs)
- 2.7 Pharmacokinetics of constant rate infusion (plasma conc. vs time profile, steady state, loading dose) (2 hrs)
- 2.8 Pharmacokinetics of IV extravascular dose (plasma conc. vs time profile, Parameters) (2 hrs)
- 2.9 Dosage regimen (Introduction, multiple dosing and the therapeutic window, drug accumulation and steady state; maintenance and loading doses, designing a dosage regimen) (4 hrs)
- 3. Clinical pharmacokinetics (12 hrs)
  - 3.1 Definition and Applications (1hr)
  - 3.2 Individualization and optimization of drug therapy (5 hrs)
    - 3.2.1 Dosage regimen adjustment in renal impairment
    - 3.2.2 Dosage regimen adjustment in hepatic impairment
    - 3.2.3 Dosage regimen adjustment in Pediatrics
    - 3.2.4 Dosage regimen adjustment in Geriatrics
    - 3.2.5 Dosage regimen adjustment in Obesity
    - 3.2.6 Pharmacokinetic drug interactions in combination therapy
  - 3.3 Therapeutic drug monitoring (5 hrs)
    - 3.3.1 Principles and applications
    - 3.3.2 Drugs requiring therapeutic drug monitoring
      - 3.3.2.1 Antibiotics – Aminoglycosides and vancomycin
      - 3.3.2.2 Anticonvulsants – Phenytoin, carbamazepine, valproic acid, Phenobarbital/primidone, ethosuximide
      - 3.3.2.3 Cardiovascular drugs – Digoxin, lidocaine, procainamide and N-acetyl procainamide and quinidine
      - 3.3.2.4 Immunosuppressants – cyclosporine and tacrolimus
      - 3.3.2.5 Other drugs - Lithium, theophylline

## **Mode of Delivery**

- Total hours: 189 hrs
- Lecture hours: 52 hrs
- Tutorial: 12 hrs
- Case Study and Presentation: 20hrs
- Home study: 105 hrs

### **Mode of Assessment**

- Group and assignments:10%
- Case study presentation: 10%
- Tests: 15%
- quizzes: 15%
- seminar presentation: 10%
- Final Exam: 40%

### **Course Policies:**

- students are expected to have 100% attendance and to read all reading assignments in advance
- Student should submit all group and/or individual assignments on due date
- Student should take all continuous assessments as scheduled.
- Student should do his/her own work and actively participate during the presentation

### **References**

1. Aulton ME, Pharmaceutics-the science of dosage form design, 2<sup>nd</sup> ed., Churchill Livingstone, 2002.
2. Shargel, L, Yu, ABC. Wu-Pong, S, Applied Biopharmaceutics and Pharmacokinetics, 5<sup>th</sup> ed. McGraw Hills, 2004
3. Washington N, Washington C, Wilson Physiological pharmaceutics-Barriers to drug absorption, 2<sup>nd</sup> ed., Taylor & Francis, London, 2002
4. Gibaldi, M., Biopharmaceutics and clinical Pharmacokinetics 3<sup>rd</sup> ed. Lea and Febiger, Philadelphia, 1984.
5. Rowland,M. and Tozer, T.N., Clinical Pharmacokinetics,3<sup>rd</sup> ed., Lea and Febiger, New Delhi, 1995
6. Curry, S.H., Drug Disposition and pharmacokinetics, 3<sup>rd</sup> ed., Blackwell Scientific Publications, Oxford, 1980.
7. Bauer,L A. Applied Clinical Pharmacokinetics, 2<sup>nd</sup> ed., McGraw-Hil, New York, 2008
8. Atkinsons AJr, Abernethy, DR, Daniels,CE, Dedrick, RL, Markey, SP, Principles of Clinical Pharmacology, 2<sup>nd</sup> ed., London, Elsvier Inc., 2007
9. Notari; R.E. Biopharmaceutics and clinical Pharmacokinetics, 4<sup>th</sup> ed. Marcel Dekker, Inc., New York, 1987.

### **Module 16: Pharmacotherapeutics**

Module name: **Pharmacotherapeutics module**

Module category: Core

Module code: Phar-M4161

**Module number: 16**

**Module weight in EtCTS: 28**

Courses: **Integrated therapeutics I (Phar4161) (7 EtCTS)**

**Integrated therapeutics II (Phar4162) (7 EtCTS)**

**Integrated therapeutics III (Phar4163) (7 EtCTS)**

**Integrated therapeutics IV (Phar4164) (7 EtCTS)**

**Physical Assessment (Phar4165) (2ECTS)**

**Module description:** Students will learn about the Pathophysiology and pharmacotherapy of various disease states that health care practitioners (pharmacists) may encounter in their practice settings. Courses in this module introduce essential therapeutic knowledge needed for providing pharmaceutical care in individual patient. These courses integrate the pathophysiologic abnormalities of disease state with concepts of drug selection, dose optimization and monitoring of therapeutic outcomes for safety and efficacy of medication. Courses discussed include: integrated therapeutics I-IV which extends from general principles of pharmacotherapy to detailed pharmacotherapy of each disease states (gastrointestinal, respiratory, cardiovascular, renal, hematologic, neurologic, psychiatric, endocrinologic, infectious diseases etc.)

**Module objective:** at the end of this module, the students are expected to:

- Explain the etiology, pathophysiology, clinical presentation and diagnosis of each disease states
- Set goals of treatment and select treatment options for the management of each disease states
- Formulate dose recommendations and pharmacokinetic considerations for individual patient management
- Monitor clinically significant adverse drug reactions and drug interactions
- Evaluate therapeutic outcomes for effectiveness, safety and patient adherence

- Develop and exercise pharmaceutical care planning for managing a specific patient condition
- Provide patient medication counseling and drug information

**Module competency:**

- Provide patient centered Pharmaceutical care services

**Mode of delivery: Block**

**Mode of Assessment:**

Continuous assessment & summative assessment: Class attendance, Continuous assessment, Assignments, Hospital attachment Report, Final Exam

**Module learning teaching methods**

Illustrated lectures and group discussions, Individual and group exercise and assignments, Role plays and case studies, Simulation, Audiovisuals, Clinical scenarios, Tutorials, Demonstration

**Integrated therapeutics I Course syllabus**

Course title: Integrated Therapeutics I

Course code: Phar4161

Course ECTS: 7 ECTS ( 7x27 = 189 hours)

- Lecture: 64 hours
- Ward attachment : 30 hours
  - Tutorial: 32 hours
  - Home study: 43 hours
  - Assessment : 8 hours
  - Project work/presentation : 12 hours
- 9 cr.hrs/week

Contact hours/ week:

Pre-requisite if any:

Pharmacology I & II

Course description:

This course is designed to introduce the pharmacy student to the study of integrated therapeutics. It will provide introductory information designed to assist the student to begin understanding the rationale upon which many drug therapy decisions are based. Principles, concepts, processes, and skills in pharmacotherapy will be emphasized. Therapeutic topics and case studies will be used to provide students with the opportunity to apply these skills. This course will also enable students to understand and interpret the common diagnostic tests. Gastrointestinal disorders will be addressed in the therapeutics section

Course objectives:

At the completion of this course the student should be able to:

- 1- understand the various factors that may influence drug therapy in a patient
- 2- Understand how to gather relevant patient information during drug

|                            |  |   |
|----------------------------|--|---|
|                            |  | therapy   |
|                            |  | 3- interpret common diagnostic tests used   |
|                            |  | 4- Understand the etiology, pathophysiology, diagnosis, treatment and monitoring parameters of therapy outcomes in the management of common gastrointestinal diseases |
| Delivery mode/methodology: | During this course the following mode of teaching can be used:   |   |
|                            | <ul style="list-style-type: none"> <li>• Illustrated lectures and group discussions</li> <li>• Individual and group exercise and assignments</li> <li>• Role plays and case studies</li> <li>• Simulation</li> <li>• Audiovisuals</li> <li>• Clinical scenarios</li> <li>• Tutorials</li> <li>• Demonstration</li> </ul>   |   |
| Assessment mechanisms:     | Continuous assessment & summative assessment   |   |
|                            | <ul style="list-style-type: none"> <li>• Test: 10%</li> <li>• Quizzes: 15%</li> <li>• Seminar presentations: 10%</li> <li>• Case presentations: 10%</li> <li>• Journal club presentation: 5%</li> <li>• Assignments (5%)</li> <li>• Hospital attachment Report (5 %)</li> <li>• Final Exam (40%)</li> </ul>  |   |
| References:                | Your Reading Materials for the Course:   |   |
|                            | <ol style="list-style-type: none"> <li>1. Dipiro JT, Talbert RL, Yee GC, et.al. Pharmacotherapy, a Pathophysiologic Approach. 7<sup>th</sup> or later edition.</li> <li>2. A Practical Guide to Pharmaceutical Care, American Pharmacists Association, 3<sup>rd</sup> edition.</li> <li>3. Koda - Kimble MA, Young LY , Kradjan WA, et.al. Applied Therapeutics, The Clinical Use of Drugs. 9<sup>th</sup> or later edition.</li> <li>4. Walker R and Edwards C. Clinical Pharmacy and Therapeutics. 3<sup>rd</sup> or later edition.</li> <li>5. Atkinson A, Daniels C, Dedrick R, et.al. Principles of Clinical Pharmacology. 1<sup>st</sup> or later edition.</li> <li>6. Kasper, Braunwald, et al. Harrison's Principles of Internal Medicine, 16<sup>th</sup> or later edition</li> <li>7. Tierney, McPhee, Papadakis. Current Medical Diagnosis and Treatment 2008 or later edition</li> <li>8. Conn's Current therapy 2008</li> <li>9. Washington Manual of Medical Therapeutics 32<sup>nd</sup> edition</li> <li>10. Jacobs &amp; DeMott Laboratory Test Handbook, 5<sup>th</sup> edition</li> <li>11. Handouts including copies of PowerPoint slides from lectures</li> <li>12. Guidelines and articles as specified by the instructor</li> </ol> |   |

#### Course Outline

| Week # | Lect. # | Topics  | Reading Material |
|--------|---------|---|------------------|
| 1      | 1       | Introduction  |                  |
|        | 2       | Clinical Pharmacokinetics (general applications & guiding principles) | Reference No. 1  |

|    |    |   |                      |
|----|----|---|----------------------|
| 2  | 3  | Drug interactions (epidemiology & mechanisms)         | Reference No. 5      |
|    | 4  | The pharmacist in patient care                        | Reference No. 1, 2,3 |
| 3  | 5  | The pharmacist in patient care                        |                      |
|    | 6  | The pharmacist in patient care                        |                      |
| 4  | 7  | Medical terminologies & common medical abbreviations  | Reference No. 3      |
|    | 8  | Diagnostic Tests(General principles)                  | Reference No. 1, 3,  |
| 5  | 9  | Diagnostic Tests(Electrolytes)                        | 10                   |
|    | 10 | Diagnostic Tests(Blood Chemistry                      |                      |
| 6  | 11 | Diagnostic Tests(Blood Chemistry                      |                      |
|    | 12 | Diagnostic Tests(Hematology)                          |                      |
| 7  | 13 | Diagnostic Tests(Hematology)                          |                      |
|    | 14 | Diagnostic Tests(Hematology)                          |                      |
| 8  | 15 | Diagnostic Tests (Hematology cont'd., Urinalysis)     |                      |
|    | 16 | Diagnostic Tests (Urinalysis)                         |                      |
| 9  | 17 | Diagnostic Tests (microbiology)                       |                      |
|    | 18 | Diagnostic imaging and common bed-side procedures     |                      |
| 10 | 19 | Basic electrocardiography                             |                      |
|    |    | 50% continuous assessment report                      |                      |
|    |    | Drug Therapy In Specific Patient Groups: Neonates and | Reference No. 1, 3,  |
|    | 20 | Pediatrics  | 5                    |
| 11 | 21 | Drug Therapy In Specific Patient Groups:              |                      |
|    |    | Geriatrics  |                      |
|    | 22 | Drug Therapy In Specific Patient Groups:              |                      |
|    |    | Pregnancy and lactation                               |                      |
| 12 | 23 | Gastrointestinal Disorders therapeutics:              | Reference No. 1, 3,  |
|    |    | Gastrointestinal tract evaluation & GERD              | 6                    |
|    | 24 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | GERD cont'd., IBD, IBS,                               |                      |
| 13 | 25 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | Peptic ulcer disease                                  |                      |
|    | 26 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | N,V &Constipation, Diarrhea                           |                      |
| 14 | 27 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | Drug induced liver disease                            |                      |
|    | 28 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | Pancreatitis  |                      |
| 15 | 29 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | Portal hypertension & cirrhosis                       |                      |
|    | 30 | Gastrointestinal Disorders therapeutics:              |                      |
|    |    | Viral hepatitis                                       |                      |

**Course title:**

**Integrated Therapeutics II**

**Course code:**

Phar4162

**Course ECTS:** 7 ECTS (189 hours)

- Lecture: 64 hours
- Ward attachment : 30 hours
- Tutorial: 32 hours
- Home study: 43 hours
  - Project work/presentation : 12 hours
  - Assessment : 8 hours
- 9 cr.hrs/week

**Contact hours/ week:**

**Pre-requisite if any:**

Integrated Therapeutics I

**Course description:**

This course is a continuation of Integrated therapeutics-I. The purpose of this course is to provide didactic framework for the therapeutic management of a number of common diseases, including renal diseases, cardiovascular diseases, pulmonary diseases, musculoskeletal diseases, and Eye and ENT. With a thorough background established in physiology, pharmacology, pharmacokinetics and other courses in the curriculum, the goal of this course is to prepare students to develop rational drug therapy plans for patients, identify conditions for monitoring pharmacotherapy in patients, and identify conditions associated with these common diseases that require referral.

**Course objectives:**

After completion of this course, students will be able to explain, practice and choose appropriate treatment strategies for cardiovascular, respiratory, musculoskeletal, and eye and ENT diseases so as to improve patient outcomes.

**Specific Objectives**

To meet this objective students will:

- Describe the pathophysiologic processes underlying the diseases
- Analyze and interpret diagnostic findings

|                            |   |
|----------------------------|---|
|                            | <ul style="list-style-type: none"> <li>• Recommend appropriate treatment regimen</li> <li>• Provide follow up and monitor outcome</li> </ul>  |
| Delivery mode/methodology: | <p>During this course the following mode of teaching can be used:</p> <ul style="list-style-type: none"> <li>• Illustrated lectures and group discussions</li> <li>• Individual and group exercise and assignments</li> <li>• Role plays and case studies</li> <li>• Simulation</li> <li>• Audiovisuals</li> <li>• Clinical scenarios</li> <li>• Tutorials</li> <li>• Demonstration</li> <li>• Hospital attachment</li> </ul>   |
| Assessment mechanisms:     | <p>Continuous assessment &amp; summative assessment</p> <ul style="list-style-type: none"> <li>• Test: 10%</li> <li>• Quizzes: 15%</li> <li>• Seminar presentations: 10%</li> <li>• Case presentations: 10%</li> <li>• Journal club presentation: 5%</li> <li>• Assignments (5%)</li> <li>• Pharmacy Patient profile (5 %)</li> <li>- Final Exam (40%)</li> </ul>   |
| References:                | <p>Your Reading Materials for the Course:</p> <ol style="list-style-type: none"> <li>1. Dipiro JT, Talbert RL, Yee GC, et.al. Pharmacotherapy, a Pathophysiologic Approach. 7<sup>th</sup> or later edition.</li> <li>2. A Practical Guide to Pharmaceutical Care, American Pharmacists Association, 3<sup>rd</sup> edition.</li> <li>3. Koda - Kimble MA, Young LY , Kradjan WA, et.al. Applied Therapeutics, The Clinical Use of Drugs. 9<sup>th</sup> or later edition.</li> <li>4. Walker R and Edwards C. Clinical Pharmacy and Therapeutics. 3<sup>rd</sup> or later edition.</li> <li>5. Atkinson A, Daniels C, Dedrick R, et.al. Principles of Clinical Pharmacology. 1<sup>st</sup> or later edition.</li> </ol> |



6. Kasper, Braunwald, et al. Harrison's Principles of Internal Medicine, 16<sup>th</sup> or later edition
7. Tierney, McPhee, Papadakis. Current Medical Diagnosis and Treatment 2008 or later edition
8. Conn's Current therapy 2008
9. Washington Manual of Medical Therapeutics 32<sup>nd</sup> edition
10. Jacobs & DeMott Laboratory Test Handbook, 5th edition
11. Handouts including copies of PowerPoint slides from lectures
12. Guidelines and articles as specified by the instructor

### Course Outline

| Week # | Lect. # | Topics   | Reading Material      |
|--------|---------|--|-----------------------|
| 1      | 1       | Renal disorders Pharmacotherapy: Acute Renal failure   | Reference No. 1,3     |
|        | 2       | Renal disorders Pharmacotherapy: Chronic Renal Failure   | Reference No. 1, 3    |
| 2      | 3       | Renal disorders Pharmacotherapy: Drug induced Renal Disease  | Reference No. 1, 3    |
|        | 4       | Renal disorders Pharmacotherapy: Glomerulonephritis  | Reference No. 1, 3,6  |
| 3      | 5       | Renal disorders Pharmacotherapy: Acid-base disorders   |                       |
|        | 6       | Renal disorders Pharmacotherapy: Disorders of fluid and electrolyte homeostasis  |                       |
|        |         | Renal disorders Pharmacotherapy: Hemodialysis and peritoneal dialysis  | Reference No.1, 3     |
| 4      | 7       | Case studies on acute renal failure, chronic renal failure, drug induced kidney disease , glomerulonephritis, acid-base disorders and Disorders of fluid and electrolyte homeostasis | Reference 1,3, 6      |
|        | 8       | Cardiovascular disorders Pharmacotherapy: Cardiovascular testing   | Reference No. 1, 3, 6 |
| 5      | 9       | Cardiovascular disorders Pharmacotherapy: Cardiopulmonary Resuscitation  |                       |
|        | 10      | Cardiovascular disorders Pharmacotherapy: Hypertension   |                       |

|    |    |  |                       |
|----|----|--|-----------------------|
| 6  | 11 | Cardiovascular disorders Pharmacotherapy: Heart failure                                    |                       |
|    | 12 | Cardiovascular disorders Pharmacotherapy: Acute coronary syndromes                         |                       |
| 7  | 13 | Cardiovascular disorders Pharmacotherapy: Acute coronary syndromes                         |                       |
|    | 14 | Cardiovascular disorders Pharmacotherapy: Coronary heart disease                           |                       |
| 8  | 15 | Cardiovascular disorders Pharmacotherapy: Cardiac arrhythmia                               |                       |
|    | 16 | Cardiovascular disorders Pharmacotherapy: VTE  |                       |
| 9  | 17 | Cardiovascular disorders Pharmacotherapy: Hyperlipidemia                                   |                       |
|    | 18 | Cardiovascular disorders Pharmacotherapy: peripheral Arterial Disease                      |                       |
| 10 | 19 | Cardiovascular disorders Pharmacotherapy: Stroke   |                       |
|    |    | 50% continuous assessment report   |                       |
|    | 20 | Cardiovascular disorders Pharmacotherapy: Shock  | Reference No. 1, 3, 5 |
|    |    | Case studies on selected cardiovascular disorders Pharmacotherapy                          |                       |
| 11 | 21 | Respiratory disorders Pharmacotherapy: Asthma  |                       |
|    | 22 | Respiratory disorders Pharmacotherapy: COPD  |                       |
|    | 23 | Respiratory disorders Pharmacotherapy: ARDs & Neonatal Respiratory distress syndrome       | Reference No. 1, 3, 6 |
| 12 | 24 | Respiratory disorders Pharmacotherapy: Drug-induced pulmonary diseases and Cystic fibrosis |                       |
|    |    | Case studies on Asthma, COPD   |                       |
| 13 | 25 | Musculoskeletal disorders Pharmacotherapy: Osteoporosis/osteomalacia                       |                       |
|    | 26 | Musculoskeletal disorders Pharmacotherapy: Osteoarthritis                                  |                       |
| 14 | 27 | Musculoskeletal disorders Pharmacotherapy: Rheumatoid Arthritis                            |                       |
|    | 28 | Musculoskeletal disorders Pharmacotherapy: Gout and Hyperuricemia                          |                       |

|    |    |  |
|----|----|--|
| 15 | 29 | Eye & ENT disorders Pharmacotherapy: Glaucoma          |
|    | 30 | Eye & ENT disorders Pharmacotherapy: Allergic Rhinitis |

### **Integrated therapeutics III**

**Course title:**

**Integrated Therapeutics III**

**Course code:**

Phar4163

**Course ECTS : 7 ECTS (189 hours)**

- Lecture: 64 hours
- Ward attachment : 30 hours
- Tutorial: 32 hours
- Home study: 43 hours
  - Project work/presentation : 12 hours
  - Assessment : 8 hours

**Contact hours/ week:**

- 9 cr.hrs/week

**Pre-requisite if any:**

Integrated Therapeutics II

**Course description:**

This is the third course in a sequence of four integrated therapeutics courses in the curriculum. The areas of therapeutic focus in integrated therapeutics-III include: hematological diseases, psychiatric diseases, neurological diseases, endocrine/metabolic disorders, gynecologic and obstetric disorders, urological disorders, and dermatological disorders. The course will utilize the case-assisted student centered learning format to enhance the student's ability to apply and utilize information in solving problems and/or enhancing patient care with medications.

**Course objectives:**

After completion of this course, the student will be able to describe, analyze and identify various hematological, psychiatric, neurologic, endocrine and metabolic, gynecology and obstetrics, urologic and dermatologic disorders; and manage drug therapy.

**Specific Objectives**

To meet this objective students will:

- Describe the pathophysiologic processes underlying

hematological, psychiatric, neurologic, endocrine and metabolic, gynecology and obstetrics, urologic and dermatologic disorders.

- Analyze and interpret diagnostic findings relevant to hematological, psychiatric, neurologic, endocrine and metabolic, gynecology and obstetrics, urologic and dermatologic disorders.
- Recommend appropriate treatment regimen for patients suffering from hematological, psychiatric, neurologic, endocrine and metabolic, gynecology and obstetrics, urologic and dermatologic disorders.

Delivery mode/methodology:

During this course the following mode of teaching can be used:

- Illustrated lectures and group discussions
- Individual and group exercise and assignments
- Role plays and case studies
- Simulation
- Audiovisuals
- Clinical scenarios
- Tutorials
- Demonstration

Assessment mechanisms:

Continuous assessment & summative assessment

- Class attendance (2.5%)
- Continuous assessment (40%)
- Assignments (5%)
- Hospital attachment Report (2.5 %)
- Final Exam (50%)

References:

Your Reading Materials for the Course:

1. Dipiro JT, Talbert RL, Yee GC, et.al.  
Pharmacotherapy, a Pathophysiologic Approach. 7<sup>th</sup> or later edition.
2. A Practical Guide to Pharmaceutical Care, American Pharmacists Association, 3<sup>rd</sup> edition.
3. Koda - Kimble MA, Young LY , Kradjan WA, et.al.

- Applied Therapeutics, The Clinical Use of Drugs. 9<sup>th</sup> or later edition.
4. Walker R and Edwards C. Clinical Pharmacy and Therapeutics. 3rd or later edition.
  5. Atkinson A, Daniels C, Dedrick R, et.al. Principles of Clinical Pharmacology. 1<sup>st</sup> or later edition.
  6. Kasper, Braunwald, et al. Harrison's Principles of Internal Medicine, 16<sup>th</sup> or later edition
  7. Tierney, McPhee, Papadakis. Current Medical Diagnosis and Treatment 2008 or later edition
  8. Conn's Current therapy 2008
  9. Washington Manual of Medical Therapeutics 32<sup>nd</sup> edition
  10. Jacobs & DeMott Laboratory Test Handbook, 5th edition
  11. Handouts including copies of PowerPoint slides from lectures
  12. Guidelines and articles as specified by the instructor

#### **Course Outline:**

| Week # | Lect. # | Topics  | Reading Material         |
|--------|---------|---|--------------------------|
| 1      | 1       | Hematological disorders Pharmacotherapy: Anemia                               | Reference No. 1,3        |
|        | 2       | Hematological disorders Pharmacotherapy: Coagulation disorders                | Reference No. 1, 2       |
| 2      | 3       | Hematological disorders Pharmacotherapy: Sickle Cell disease                  | Reference No. 1, 4       |
|        | 4       | Hematological disorders Pharmacotherapy: Drug induced Hematological disorders | Reference No. 1, 2, 3, 4 |
| 3      | 5       | Psychiatric disorders Pharmacotherapy: Childhood disorders                    | Reference No. 1, 3       |
|        | 6       | Psychiatric disorders Pharmacotherapy: Sleep disorders                        | Reference No. 1, 2, 3    |
| 4      | 7       | Psychiatric disorders Pharmacotherapy: Anxiety Disorders                      | Reference No. 1, 3       |
|        | 8       | Psychiatric disorders Pharmacotherapy: Schizophrenia                          | Reference No. 1, 3       |
| 5      | 9       | Psychiatric disorders Pharmacotherapy: Schizophrenia, Eating Disorders        | Reference No. 1, 3       |
|        | 10      | Psychiatric disorders Pharmacotherapy: Mood disorders I                       | Reference No. 1, 3       |

|    |    |  |                    |
|----|----|--|--------------------|
| 6  | 11 | Psychiatric disorders Pharmacotherapy: Mood disorders II, Bipolar Disorders I  | Reference No. 1, 3 |
|    | 12 | Psychiatric disorders Pharmacotherapy: Substance abuse-related disorder  | Reference No. 1, 3 |
| 7  | 13 | Neurological disorder Pharmacotherapy: Pain management   | Reference No. 1, 3 |
|    | 14 | Neurological disorder Pharmacotherapy: Headache disorders  | Reference No. 1, 3 |
| 8  | 15 | Neurological disorder Pharmacotherapy: Epilepsy and status epileptics  | Reference No. 1, 3 |
|    | 16 | Neurological disorder Pharmacotherapy: Epilepsy and status epileptics  | Reference No. 1, 3 |
| 9  | 17 | Neurological disorder Pharmacotherapy: Parkinsonism  | Reference No. 1, 3 |
|    | 18 | Neurological disorder Pharmacotherapy: Alzheimer's disease   | Reference No. 1, 3 |
| 10 | 19 | Neurological disorder Pharmacotherapy: Acute management of Brain Injury Patient, Spastic disorders, Multiple Sclerosis | Reference No. 1, 3 |
|    |    | 50% continuous assessment report   |                    |
|    | 20 | Endocrine disorder Pharmacotherapy: Thyroid disorder   | Reference No. 1, 3 |
| 11 | 21 | Endocrine disorder Pharmacotherapy: Diabetes mellitus  |                    |
|    | 22 | Endocrine disorder Pharmacotherapy: Diabetes mellitus  |                    |
| 12 | 23 | Endocrine disorder Pharmacotherapy: Pituitary gland Disorders  | Reference No. 1, 3 |
|    | 24 | Gynecologic and obstetric disorders Pharmacotherapy: Pregnancy associated diseases                                     | Reference No. 1, 3 |
| 13 | 25 | Gynecologic and obstetric disorders Pharmacotherapy: Contraception   | Reference No. 1, 3 |
|    | 26 | Gynecologic and obstetric disorders Pharmacotherapy: Menstruation-related disorders                                    | Reference No. 1, 3 |
| 14 | 27 | Gynecologic and obstetric disorders Pharmacotherapy: Hormone therapy in women, Female Infertility                      | Reference No. 1, 3 |
|    | 28 | Urologic disorders Pharmacotherapy: Erectile Dysfunction   | Reference No. 1, 3 |
| 15 | 29 | Urologic disorders Pharmacotherapy:  | Reference No. 1, 3 |
|    |    | BPH, Urinary incontinence  |                    |
|    | 30 | Dermatologic disorders Pharmacotherapy:  | Reference No. 1, 3 |
|    |    | Overview, epidemiology, causes, Pathophysiology, clinical  |                    |

presentations, diagnosis, treatment(goal, non-pharmacological and pharmacological) and case studies of Dermatological Drug reactions, Self-treatable skin disorders, Acne, Psoriasis, Atopic dermatitis ( total of 6 hours)

|                                 |  |
|---------------------------------|--|
| <b>Course title:</b>            | <b>Integrated Therapeutics IV</b>  |
| Course code:                    | Phar4164   |
| Course ECTS: 7 ECTS (189 hours) | <ul style="list-style-type: none"> <li>• Lecture: 64 hours</li> <li>• Ward attachment : 30 hours</li> <li>• Tutorial: 32 hours</li> <li>• Home study: 43 hours</li> <li>• Project work/presentation :12 hours</li> <li>• Assessment : 8 hours</li> </ul>   |
| Contact hours/ week:            | <ul style="list-style-type: none"> <li>• 9 cr.hrs/week</li> </ul>  |
| Pre-requisite if any:           | Integrated Therapeutics III  |
| Course description:             | This course is a continuation of integrated therapeutics III. It is designed to prepare graduate pharmacy students to manage a number of common diseases, including infectious, immunological, oncologic, and nutritional disorders. It also prepares students to develop rational drug therapy plans, identify conditions for monitoring pharmacotherapy, and conditions that require referral.   |
| Course objectives:              | <p>After completion of this course, the student will be able to describe, analyze and identify various infectious, oncologic, immunologic, and nutritional disorders; and manage drug therapy.</p> <p>Specific Objectives</p> <p>To meet this objective students will:</p> <ul style="list-style-type: none"> <li>• Describe the pathophysiologic processes underlying infectious diseases, oncologic, immunologic, nutritional disorders.</li> <li>• Analyze and interpret diagnostic findings relevant to infectious, oncologic, immunologic, and nutritional disorders.</li> <li>• Recommend appropriate treatment regimen for patients suffering from infectious, oncologic, immunologic, and nutritional disorders.</li> <li>• Provide follow up and monitor outcomes in patients who have infectious, oncologic, immunologic, and nutritional disorders</li> <li>• Perform research and activities in pharmacotherapy of infectious, oncologic, immunologic, and nutritional disorders.</li> </ul> |
| Delivery mode/methodology:      | During this course the following mode of teaching can be used:   |

- Illustrated lectures and group discussions
- Individual and group exercise and assignments
- Role plays and case studies
- Simulation
- Audiovisuals
- Clinical scenarios
- Tutorials
- Demonstration

Assessment mechanisms:

Continuous assessment & summative assessment

- Test: 10%
- Quizzes: 15%
- Seminar presentations: 10%
- Case presentations: 10%
- Journal club presentation: 5%
- Assignments (5%)
- Pharmacy Patient profile (5 %)
- Final Exam (40%)

References:

Your Reading Materials for the Course:

1. Dipiro JT, Talbert RL, Yee GC, et.al. Pharmacotherapy, a Pathophysiologic Approach. 7<sup>th</sup> or later edition.
2. A Practical Guide to Pharmaceutical Care, American Pharmacists Association, 3<sup>rd</sup> edition.
3. Koda - Kimble MA, Young LY , Kradjan WA, et.al. Applied Therapeutics, The Clinical Use of Drugs. 9<sup>th</sup> or later edition.
4. Walker R and Edwards C. Clinical Pharmacy and Therapeutics. 3<sup>rd</sup> or later edition.
5. Atkinson A, Daniels C, Dedrick R, et.al. Principles of Clinical Pharmacology. 1<sup>st</sup> or later edition.
6. Kasper, Braunwald, et al. Harrison's Principles of Internal Medicine, 18<sup>th</sup> or later edition
7. Tierney, McPhee, Papadakis. Current Medical Diagnosis and Treatment 2008 or later edition
8. Conn's Current therapy 2008
9. Washington Manual of Medical Therapeutics 32<sup>nd</sup> edition
10. Jacobs & DeMott Laboratory Test Handbook, 5<sup>th</sup> edition
11. Handouts including copies of PowerPoint slides from lectures
12. Guidelines and articles as specified by the instructor



## Course outline

| Week # | Lect.<br># | Topics  | Reading<br>Material      |
|--------|------------|---|--------------------------|
| 1      | 1          | Infectious diseases Pharmacotherapy: Principles of antimicrobial regimen selection            | Reference<br>No. 1, 3, 6 |
|        | 2          | Infectious diseases Pharmacotherapy: Upper respiratory tract infections                       |                          |
| 2      | 3          | Infectious diseases Pharmacotherapy: Lower respiratory tract infections                       |                          |
|        | 4          | Infectious diseases Pharmacotherapy: Infective Endocarditis, Eye infections                   |                          |
| 3      | 5          | Infectious diseases Pharmacotherapy: Skin and soft tissue infections                          |                          |
|        | 6          | Infectious diseases Pharmacotherapy: Urinary tract infections and Prostatitis                 |                          |
| 4      | 7          | Infectious diseases Pharmacotherapy: Gastrointestinal infections                              |                          |
|        | 8          | Infectious diseases Pharmacotherapy: Intra-abdominal infections                               |                          |
| 5      | 9          | Infectious diseases Pharmacotherapy: Parasitic infections; Osteomyelitis and Septic arthritis |                          |
|        | 10         | Infectious diseases Pharmacotherapy: Central Nervous System infections                        |                          |
| 6      | 11         | Infectious diseases Pharmacotherapy: Tuberculosis   |                          |
|        | 12         | Infectious diseases Pharmacotherapy: Sexually Transmitted Infections                          |                          |
| 7      | 13         | Infectious diseases Pharmacotherapy: Human Immunodeficiency Virus infection and OIs           |                          |
|        | 14         | Infectious diseases Pharmacotherapy: Human Immunodeficiency Virus infection and OIs           |                          |
| 8      | 15         | Infectious diseases Pharmacotherapy: Human Immunodeficiency Virus infection and OIs           |                          |
|        | 16         | Infectious diseases Pharmacotherapy: Human Immunodeficiency Virus infection and OIs           |                          |
| 9      | 17         | Infectious diseases Pharmacotherapy: Superficial fungal infections                            |                          |
|        | 18         | Infectious diseases Pharmacotherapy: Invasive fungal infections                               |                          |
| 10     | 19         | Infectious diseases Pharmacotherapy: Surgical antibiotic prophylaxis                          |                          |
|        |            | 50% continuous assessment report  |                          |

|    |    |  |                    |
|----|----|--|--------------------|
|    | 20 | Immunological Disorders Pharmacotherapy: Systemic Lupus Erythematosus and Other Collagen-Vascular diseases | Reference No. 1, 3 |
| 11 | 21 | Immunological Disorders Pharmacotherapy: Allergic and Pseudo-allergic Drug Reactions                       |                    |
|    | 22 | Immunological Disorders Pharmacotherapy: Solid-Organ Transplantation                                       |                    |
| 12 | 23 | Oncologic disorders Pharmacotherapy: Pituitary gland Disorders   | Reference          |
|    | 24 | Oncologic disorders Pharmacotherapy: Principles of cancer treatment and chemotherapy                       | No. 1, 3           |
| 13 | 25 | Oncologic disorders Pharmacotherapy: Breast cancer   |                    |
|    | 26 | Oncologic disorders Pharmacotherapy: Lung cancer   |                    |
| 14 | 27 | Oncologic disorders Pharmacotherapy: Colorectal cancer; Multiple myeloma                                   |                    |
|    | 28 | Oncologic disorders Pharmacotherapy: Prostate cancer   |                    |
| 15 | 29 | Oncologic disorders Pharmacotherapy: Lymphomas; Ovarian and cervical cancer                                |                    |
|    | 30 | Oncologic disorders Pharmacotherapy: Acute Leukemias; Chronic Leukemias                                    |                    |
| 16 | 31 | Oncologic disorders Pharmacotherapy: Oncologic emergencies   |                    |
| 17 | 32 | Nutritional disorders Pharmacotherapy: Parenteral & Enteral Nutrition                                      |                    |
| 18 | 33 | Nutritional disorders Pharmacotherapy: Obesity; Nutritional considerations in major organ failure          |                    |
| 19 | 34 | Research in Pharmacotherapy:   |                    |

## Physical assessment Course syllabus

|                       |   |
|-----------------------|---|
| Course title:         | Physical assessment   |
| Module Name           | Module 16: Integrated therapeutics  |
| Course code:          | PhyD 4165   |
| Course ECTS: 2 hours  | <ul style="list-style-type: none"><li>✓ Lecture: 8hrs</li><li>✓ Demonstration: 24hrs</li><li>✓ Tutorial: 6hours</li><li>✓ Home study: 40hours</li><li>✓ Assessment: 6 hours</li></ul> |
| Contact hours/ week:  | ✓ 2 cr. hrs./week   |
| Pre-requisite if any: |   |

### Course description:

The physical assessment course is anchored primarily within the competency statement to “Design, implement, evaluate, and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care.” A terminal objective defined cognitive functions to “integrate patient, disease, and drug data to determine desired therapy decisions for the patient” (1). The enabling objective is to “perform appropriate physical assessment to obtain pertinent information from patients for a patient-specific database.” To satisfy this enabling objective, the course teaches the skillful performance of motor acts that involve complex movement patterns. To show mastery of this competency and its objectives, course objectives are to select information from the chart or other patient records, use effective interviewing skills to obtain information, perform appropriate physical assessment skills to obtain pertinent data from a simulated or real patient for making decisions, analyze and organize historical and physical data for making decisions and devise a plan for meeting the patient’s health care needs. The course introduces the art and science of the physical examination and provides examples of applying physical assessment to therapeutic decision making.

### General Course objectives:

Following completion of the physical assessment course, the student will be able to:

- ✓ Understand the role of physical assessment techniques in pharmacy practice.
- ✓ Perform a variety of physical assessments that will be helpful for pharmacy practice in the retail setting, ambulatory care clinic, and acute care setting.

- ✓ Interview patients, including asking open-ended questions, taking a thorough medication history, and asking questions in the review of systems that are pertinent to a specific patient

**Detailed objectives of the course:**

At the completion of the course, the student will demonstrate the ability to assess physical abnormalities and monitor drug therapy by satisfactorily performing a physical examination on a simulated or real patient.

**1. Basic Principles of Communication; Basic Patient interviewing.**

*At the end of the topic students shall be able to:*

- Use open-ended questions to gather unbiased, patient-centered information from patients.
- Use closed-ended questions to clarify and/or confirm information.
- Demonstrate active-listening skills.
- Properly introduce self to patient and provide comfortable setting that promotes respect, empathy, and confidentiality in interviewing.
- Use proper dress, professional mannerism, voice tone, language, "body language," and recording techniques to promote patient communication.
- Screen systems quickly and redirect interview using directed and closed-ended questions.
- Demonstrate sensitivity in dealing with sensitive topics such as: death & dying, sexual activity & history, domestic violence, psychiatric illness, alcohol and/or drug abuse
- List techniques for dealing with patients with special needs (e.g. geriatrics, pediatrics, inebriated patients, adolescents, hostile patients, schizophrenics, attractive or seductive patients, AIDS patients, patients of different cultures, blind patients).

**2. The Health History: Medication History.**

*At The end of this topic the students shall be able to*

- Describe the components, content and organization of the health history (e.g. chief complaint, history of present illness, past medical history, etc.).
- Obtain complete, descriptive data of the history of present illness by use of the "Basic Seven."
- Perform and record a health history, up to the Review of Systems, on a real or simulated patient.
- Perform a medication history including:
  - ✓ Appropriate medication history documentation,
  - ✓ Drug allergies, use of OTC products or herbal therapies
  - ✓ An assessment of the patient's compliance with treatment, response to therapy,

- ✓ Presence or lack of adverse reactions,
- ✓ A plan for any indicated interventions or other corrective action, if indicated.

### 3. **Review of Systems; Approach to Symptoms.**

*At The end of this topic the students shall be able to*

- List appropriate questions to screen for abnormalities of the various body systems.
- Obtain and record a Review of Systems on a real or simulated patient, using open-ended questions for screening, and directed, closed-ended questions to clarify problems.
- Obtain complete, descriptive data by use of the "Basic Seven."
- Interpret patient symptoms and describe in medical terminology that facilitates a differential diagnosis or presentation to a physician for a differential diagnosis.
- Apply the information obtained from a health history, complete with review of systems, to monitor a real or simulated patient's response to a given drug for a general condition (e.g. pain) and identification of any adverse drug reactions.

### 4. **Documentation & SOAP/SOAR Format.**

*At The end of this topic the students shall be able to*

- Classify all findings as subjective or objective.
- Given a patient interview, history, physical findings and laboratory data, decide which findings are most appropriate to include in your note.
- Write assessments and plans that are accurate, clear, and concise.

### 5. **Physical Assessment Techniques: general appearance and vital signs.**

*At the end of this topic the students shall be able to:*

- Describe room environment and positioning of the patient during the physical exam.
- Identify general appearance of sick patients
- Demonstrate appropriate technique for measuring vital signs in adult patients.
- List the normal ranges of vital signs in adult patients.

### 6. **Assessment of the Head, Eyes, Ears, Nose, Throat and Skin**

*At The end of this topic the students shall be able to:*

- Name the structures of the head, eye, ears, nose and throat.
- Examine the head and neck, describing the possible abnormalities using the correct terminology.
- Know how to palpate the lymph nodes and be familiar with reasons attributable to enlarged lymph nodes.

- Discuss expected facial/neck findings in inadequately treated hypo- or hyperthyroidism.
- Demonstrate how to test for visual acuity, visual fields, the external eye structures, and ocular movements, describing normal and possible abnormal findings.
- Examine extra ocular movements, and name the eye muscles and cranial nerves involved in each direction tested.
- Describe the different parts and appropriate use of ophthalmoscope and otoscope.
- Examine papillary response, accommodation, the iris, lacrimal apparatus, and the anterior chamber, explaining possible abnormalities.
- List drugs that have adverse ocular effects and the techniques for assessing such effects.
- Perform a funduscopy exam, describing structures examined.
- Describe funduscopy monitoring for glaucoma, increased intraocular pressure, or adverse ocular effects caused by poorly controlled hypertension or diabetes.
- Examine the ear, describing the structures of the external and inner ear and discuss findings one might find in otitis externa and/or otitis media.
- Describe how the performance of an ear exam on a child is different from that of an adult.
- Test hearing, lateralization, and auditory air and bone condition.
- Examine the nose and mouth, describing structures. Discuss potential abnormalities.
- List objective terms used to describe the qualities of the hair, skin, and nails.
- Use appropriate terms to describe the color, shape, size, structure, and distribution of abnormal dermatological lesions.
- Use appropriate documentation to document the physical findings of the head, eyes, ears, nose, throat, and skin.

## 7. **Assessment of the Nervous System and the Mental Status**

*At The end of this topic the students shall be able to:*

- List the 12 cranial nerves and explain the function of each.
- Examine the 12 cranial nerves and document findings.
- Explain the motor and sensory pathways of the nervous system, examine each, and document findings.
- Identify the dermatomes used in pain assessment.
- Examine and grade the reflexes and document findings.
- Examine and grade muscle strength and document findings.

- Demonstrate techniques for evaluating and reporting level of consciousness, appearance, behavior, orientation, and affect in a patient.
- Demonstrate techniques for evaluating and reporting speech and language that may be abnormal in a patient with a developmental, neurological, mental or emotional condition.
- Asks appropriate questions to determine a patient's mood, affect, and attitude as a tool to determine a patient's probability of compliance with treatment, response to antidepressants, and identification of depressive adverse effects to medication (e.g., antihypertensives).
- Determine a patient's orientation, memory, and higher cognitive functions using appropriate questioning and assessment tools (e.g., proverbs, serial 7 subtraction).
- Perform a complete mental status exam on a real or simulated patient, and discuss drugs or drug classes, which are monitored by use of elements in the mental status exam.
- Be able to incorporate your mental status findings into a SOAP format chart note.

#### 8. **Assessment of the Cardiovascular System**

*At The end of this topic the students shall be able to:*

- Identify the point of maximal impulse by inspection and palpation.
- Identify auscultation locations for the 4 heart valves.
- Using proper auscultation techniques, identify SB1B and SB2B heart sounds as well as common "extra" heart sounds.
- Describe the grading and attributes of murmurs.
- Identify the valve and abnormality (stenosis or insufficiency) most likely associated with different murmurs based on location and timing of the murmur.
- Measure the jugular venous pressure and discuss the significance of elevated pressure.
- Palpate the following pulses: carotid, radial, ulnar, brachial, dorsalis pedis, posterior tibial popliteal, and femoral.
- Examine the lower extremities for edema.
- Accurately measure blood pressure using a sphygmomanometer.
- Appropriately document physical findings on a patient record.
- Using proper interviewing technique, effectively obtain information from a patient regarding his or her disease (history, symptomatology, etc.) and drug history.
- For a given patient with a given cardiovascular disease, utilize appropriate physical assessment techniques to assess disease severity, monitor drug efficacy and adverse effects.

**9. Assessment of the Thorax and Lungs**

*At The end of this topic the students shall be able to:*

- Identify intercostal spaces, structures of the chest and back, and location of the lungs.
- Inspect the thorax and describe retractions, and abnormalities found in COPD.
- Percuss the lungs and excursion of the diaphragm in the correct locations.
- Palpate the lungs and describe fremitus.
- Auscultate the lungs and describe possible adventitious sounds and associate pathology.
- Describe abnormal patterns of breathing and their significance.
- Demonstrate appropriate documentation of pulmonary findings.

**10. Assessment of the Musculoskeletal Systems, Abdomen, Rectum, Anus, Breast, and Prostate:**

*At The end of this topic the students shall be able to:*

- Assess significant joints for range of motion, crepitus, inflammation, and deformities.
- Examine, grade and report muscle strength.
- Use appropriate documentation to document physical findings of the musculoskeletal system examination.
- List the proper sequence of examination techniques for the abdomen.
- Indicate where the internal organs are located with respect to the abdomen.
- Auscultate the abdomen for bowel sounds and bruits (aorta, renal, iliac and femoral)
- Perform light and deep palpation of the abdomen to examine for tenderness, landmarks of the liver or spleen, fluid, and masses.
- Be able to determine liver size through percussion.
- Be able to percuss for splenomegaly, and for costovertebral angle tenderness.
- Describe possible findings in appendicitis and/or acute cholecystitis.
- On lab model or through description, examine the anus, rectum, breast, and prostate.

**11. Assessment of the Infant, Child and Adolescent**

*At The end of this topic the students shall be able to:*

- Describe the normal vital signs for an infant and child.
- Demonstrate special procedures for examining an infant or child.
- Discuss special considerations in examining or counseling an adolescent.



## 12. Injecting Techniques

At The end of this topic the students shall be able to:

- Able to administer drugs via different parenteral routs like: IV, IM, SC and IP
- Appreciate other routs of drug administration

### Delivery mode/methodology:

During this course the following mode of teaching can be used:

- ✓ Illustrated lectures and group discussions
- ✓ Individual and group exercise and assignments
- ✓ Role plays and case studies
- ✓ Simulation
- ✓ Audiovisuals
- ✓ Clinical scenarios
- ✓ Tutorials
- ✓ Demonstration

NB. The content focus underpins the functions of a pharmacist providing patient care (not a discourse on physical diagnosis.)

### Assessment mechanisms:

Continuous assessment & summative assessment

- ✓ Test: 10%
- ✓ Quizzes: 10%
- ✓ Demonstration : 30%
- ✓ Assignments: 10%
- ✓ Final Exam (40%)

### Course outline:

| SN | Topics   | Hours | References |
|----|--|-------|------------|
| 1  | Basic Principles of Communication; Basic Patient interviewing:       | 1.0   | 3,4,5      |
| 2  | The Health History: Medication History                               | 1.0   | 3,4,5      |
| 3  | Review of Systems; Approach to Symptoms.                             | 2.0   | 1,2,6      |
| 4  | Documentation & SOAP/SOAR Format.                                    | 2.0   | 1,2,6      |
| 5  | Physical Assessment Techniques, general appearances and vital signs. | 1.0   | 1,2,6      |

|    |   |     |       |
|----|---|-----|-------|
| 6  | Assessment of the Head, Eyes, Ears, Nose, Throat and Skin                               | 1.0 | 1,2,6 |
| 7  | Assessment of the Nervous System and the Mental Status                                  | 1.0 | 1,2,6 |
| 8  | Assessment of the Cardiovascular System   | 1.0 | 1,2,6 |
| 9  | Assessment of the Thorax and Lungs  | 1.0 | 1,2,6 |
| 10 | Assessment of the Musculoskeletal Systems, Abdomen, Rectum, Anus, Breast, and Prostate: | 1.0 | 1,2,6 |
| 11 | Assessment of the Infant, Child and Adolescent  | 2.0 | 1,2,6 |
| 12 | Injecting techniques  | 2.0 | 7     |

## References:

1. Lynn S. Bickley, Peter G. Szilagyi. **Bates' *Guide To Physical Examination And History Taking***, 12th ed. By Wolters Kluwer, Philadelphia, 2013.
2. Rhonda M. Jones, Raylene M. Rospond. Patient Assessment in Pharmacy Practice, 2<sup>nd</sup> ed, 2009. By Lippincott Williams & Wilkins, a Wolters Kluwer business
3. Strand LM, Cipolle RJ, Morley PC. Pharmaceutical care: an introduction. 1992. Upjohn Co.
4. Strand LM, Cipolle RJ, Morley PC. Drug-related problems; their structure and function. Ann Pharmacotherapy 1990.
5. Canady BR, Yarborough PC. Documenting pharmaceutical care: creating a standard. Ann Pharmacotherapy 1994.
6. Karen J. Tietze. Clinical skills for pharmacists: a patient focused approach, 1<sup>st</sup> ed , 2012. By Mosby, Inc., an affiiate of Elsevier Inc.
7. Pamela Evans-Smith. Lippincott's Photo Atlas of Medication Administration by Lippincott, latest ed. Williams & Wilkins, a Wolters Kluwer business

**Module 17: Pharmacy practice module****Module category:** Core**Module code:** Phar-M4171**Module number:** 17**Module weight in EtCTS:** 25 ECTS**Courses:** Drug informatics (Phar4171) (3 EtCTS)

Communication skills for pharmacists (Phar4172) (3 EtCTS)

Pharmacy law and ethics (Phar4173) (3 EtCTS)

Pharmacy practice-I (Phar4174) (5 EtCTS)

Pharmacy practice-II (Phar4175) (5 EtCTS)

First aid (Phar4176) (3 EtCTS)

Nutrition (Phar4177) (3 EtCTS)

**Module description**

Pharmacy practice module equips students with the practical principles of the pharmacy profession in various pharmacy practice settings. It encompasses various theoretical principles, steps and processes, as well as legal and ethical principles which should be considered during pharmacy practice. The module deals about effective ways of drug related information gathering, biomedical literatures evaluation and communication to promote rational drug use. It also focuses on the effective way of communication in pharmacy practice. In addition, the pharmacy practice module deals with the pharmacological and non-pharmacological interventions like first aid and nutritional supplements for the better care of clients/patients.

The module, therefore, offers topics on principles of ethical decision-making and pharmacy practices, laws, regulations and directives pertaining to pharmaceutical services, and drug information. The module also provides an extended theoretical discussion on pharmacy practice in class and in various pharmacy practice settings: community and hospital pharmacies, pharmaceutical industry, drug regulatory body, research institutes, drug supply and distribution agencies, and pharmacy associations as per practice protocols and standards of the day. It prepares the student to develop good working relationships with other health care professionals, and participate in public health education.

**Module objective:**

After completion of this module students will be able to:

- Manage, communicate and apply drug information.
- Describe the importance and strategies of effective communication skills in meeting pharmacists' professional responsibilities.
- Discuss the legal and ethical principles which are applied in pharmacy practices and develop responsible attitude.
- Discuss and practice a broad range of activities in pharmacy practice.
- Apply the knowledge and skill of first aid and accident prevention anywhere

- Discuss about micro and macro nutrients and the different strategies and activities in nutrition interventions.

### **Module competency:**

By the end of this module, students should be able to:

- Discuss the different practices, principles and protocols in pharmacy settings
- Manage rational use of medications, including the measurement and assurance of medication therapy outcomes
- Design and oversight of safe, accurate, and timely medication distribution systems
- Relate the theory with practices in delivery of pharmaceutical services
- Discuss the legal and ethical principles that apply in pharmacy practices and develop responsible attitude.
- Resolve ever-increasing ethical dilemma in the service delivery
- Actively involve and be most accessible participant in promotion of public wellness, health improvement, and disease prevention through offering first aid and nutritional supplements
- Evaluate all aspects of drug information literatures critically
- Conduct a systematic search of the tertiary, secondary, and primary literature in order to answer a drug information request.

### **Mode of delivery:** Block/Parallel

Totally required hours for the module:  $25 \times 27 = 675$ hrs

Lecture hours: 135hrs )

Practice hours: 330 hrs

Study hours: 90 hrs

Group work: 31 hrs

Presentation(s): 31hrs

Tutorial: 25 hrs

Assessment: 34hrs (5%)

### **Mode of Assessment:**

The assessment criteria are based on continuous assessment of class activities, individual and group assignment, case presentations, role play, journal club presentations, practical attachments, report writing, tests/quizzes and final exams. This in turn can be broken down into;

|  |      |
|--|------|
| Group assignments and presentations.....         | 30%  |
| Evaluations of onsite practice performance ..... | 20%  |
| Tests/quizzes .....                              | 20%  |
| Final Exam.....                                  | 30%  |
| Total.....                                       | 100% |

**Module mode of delivery:** Block/Parallel

Totally required hours for the module:  $17 \times 27 = 459$ hrs

## **Module learning and teaching methods**

### **A. Learning Activities**

Students are supposed to involve in the following major learning activities:

- Learning by doing independent study, practices, group assignments, presentation, report writing, preparing seminars, resolving ethical dilemma etc...
- Participating actively in class lectures;
- Critical Analysis, summarization and presentations of journal articles and relevant documents

### **B. Teaching Methods**

- The course instructor is expected to lecture for introducing concepts and topics, and give references, facilitate discussions, ask questions, give and correct assessments, forming groups, encouraging students for peer learning
- Arrange and facilitate seminar sessions prepared by students

## **Teachers' and students' role**

### **i. Roles of Instructors**

Instructors should be well versed in the outcomes expected of students and the pedagogical methods that best enhance learning. Accordingly, they will be expected to:

- Be a facilitator (introduce the subject; give guidance, moderate discussions, etc.)
- Closely supervise in actual practice in different clinical and community settings
- Assists students in resolving ever-increasing ethical dilemma in the service delivery
- Foster and assess self-initiated student learning
- Read and comment assignments of students on time;
- Prepare his/her lessons and deliver lectures;
- Provide available and necessary reference materials
- Encourage active participation of students in the teaching learning process;
- Strive to be the role model ethically and professionally

### **ii. Roles of Students**

Students are expected to:

- Make every effort to apply valid research findings and theoretical teachings into practice in various practice settings
- Engage in learning by doing independent study, project work; group work, etc..
- Be active learners (participate effectively in group assignments, perform practice actively, make presentations, write reports, prepare seminars etc.);
- Critically assess laws, regulations, journal articles and related topics from different sources

## **Drug Informatics course guide book/syllabus in Modular Approach**

**Course title: Drug informatics**

**Course code: Phar 4171**

**Course EtCTS: 3**

Course Hours: 3 (This course needs a total of  $3 \times 27 = 81$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 32 hours
- Home study : 27 hours
- Tutorial : 8 hours
- Project work/presentation : 8 hours
- Assessment : 6 hours

Pre-requisite: computer literacy

### *Course Description:*

This course is designed to provide pharmacy students with an overview of drug information resources used in healthcare system. Students will learn the advantages and disadvantages of primary, secondary, and tertiary literatures and will also gain experience of extracting information from these types of literature. The students will learn how to evaluate the biomedical literature using a systematic approach and will assess the statistical analyses reported to determine whether the interpretation and conclusions are valid. Students will also have a hands-on training at the Drug Information Center, SOP on the various computer based drug information resources.

### *Course objectives:*

After completion of this course students will be able to:

- ❖ Rapidly locate and evaluate drug information sources
- ❖ Systematically manage and communicate drug information
- ❖ Apply drug information knowledge for preparation and management of formularies, guidelines and bulletins.
- ❖ Provide drug information to health care professionals and patients on the rational use of drugs.
- ❖ Compare and contrast online resources to printed resources.
- ❖ Differentiate between primary, secondary and tertiary literature.

| Allotted time<br>(hours) | Topics   | Reading Material   |
|--------------------------|--|--------------------|
| 1                        | 1. Introduction to the concept of drug Information   | Reference No. 1,2  |
|                          | 1.1. Definitions of basic terms  |                    |
|                          | 1.2. The evolution of DI   |                    |
| 2                        | 1.3. Medication information services and skills  |                    |
|                          | 1.4. Factors influencing the evolution of the pharmacist's role as a medication information provider |                    |
|                          | 1.5. Opportunities in specialty practice   | Reference No. 1, 2 |
| 8                        | 2. Systematic approach to receiving and answering questions on drugs                                 |                    |
|                          | 2.1. Steps in the modified systematic approach:  |                    |
|                          | • Requestor Demographics   |                    |
|                          | • Background Questions   |                    |
|                          | • Ultimate Question/Categorization of Question   |                    |
|                          | • Search Strategy  |                    |
|                          | - Search Engines/Meta-Search Engines   |                    |
|                          | - Pubmed/Medline   |                    |
|                          | - Micromedex/Clinical Pharmacology/Lexi-Comp's CRL   |                    |
|                          | - Other Internet-Based Resources   |                    |
|                          | - Systematic Search  |                    |
|                          | • Data Evaluation, Analysis, and Synthesis   |                    |
|                          | • Formulation and Provision of Response  |                    |
|                          | • Follow-Up, Follow-Through, and Documentation   |                    |
| 6                        | 3. Types of Drug Information Resources   | Reference No. 1, 2 |
|                          | 3.1. Primary   |                    |
|                          | 3.2. Secondary   |                    |
|                          | 3.3. Tertiary  |                    |
|                          | 3.4. Other Internet-Based Sources  |                    |
| 4                        | 4. Core Drug Information Resources   |                    |
| 5                        | 5. Specialized Drug Information Sources  | Reference No. 1, 2 |
| 5                        | 6. Introduction to literature evaluation   |                    |
|                          | 6.1. Controlled Clinical Trial   |                    |

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|                   |  |                    |
|-------------------|--|--------------------|
| 7                 | 6.2. Observational studies   |                    |
|                   | 6.3. Review articles evaluation  |                    |
| 3                 | 7. Evidence based clinical practice guidelines                             | Reference No. 1, 2 |
| 3                 | Evidence based clinical practice guidelines <b>continued</b>               |                    |
| 6                 | 8. Ethical/Legal Issues in Drug Information                                | Reference No. 1, 2 |
|                   | 8.1. What Is Ethics and What Is Not  |                    |
|                   | 8.2. Ethical Dilemmas in Pharmacy Practice                                 |                    |
|                   | 8.3. Basics of Ethics Analysis   |                    |
|                   | 8.4. Labeling and Advertising  |                    |
|                   | 8.5. Liability Concerns for Internet Information                           |                    |
|                   | 8.6. Intellectual Property Rights  |                    |
| 5                 | 9. Professional writing  | Reference No. 1, 2 |
| 6                 | 10. Drugs & Therapeutics Committee   |                    |
|                   | 10.1. Introduction   |                    |
|                   | 10.2. Organizational Background  |                    |
|                   | 10.3. Clinical Guidelines  |                    |
|                   | 10.4. Standard Order Set Development                                       |                    |
|                   | 10.5. Communication within an Organization                                 |                    |
| 4                 | 11. Formulary management   | Reference No. 1, 2 |
| 4                 | 12. Drug evaluation monographs   | Reference No. 1, 2 |
| 3                 | 13. Medication misadventures: Adverse drug reactions and medication errors | Reference No. 1, 2 |
| <b>Final exam</b> |  |                    |

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**Mode of delivery:**

This course is taught using a variety of instructional methods including:

- Illustrated Lectures and case studies
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments



- Presentations
- DIC visit
- Information retrieval from various internet portals, databases and printed materials

### **Mode of Assessment:**

Continuous assessment & summative assessment

- Assignments: 20%
- Quizzes: 15%
- Presentations : 10%
- Tests: 15%
- Critical appraisal:10%
- Final exam: 30%

### **References**

1. Malone PM et al. Drug Information: A Guide for pharmacists, 2<sup>nd</sup> edition, McGraw-Hill Companies, Inc., 2001, USA.
2. Online Drug Information Databases
3. American Hospital Formulary Service: Drug Information
4. Drug Facts and Comparison
5. Sewell, W. Guide to Drug Information, Drug Intelligence Pub. Hamilton, Ill., 1976.
6. Slaughter RL, Edwards D. Evaluating Drug Literature: A Statistical Approach, McGraw-Hill Companies, Inc., 2001, USA.
7. Remington's: The Science and Practice of Pharmacy, 21<sup>st</sup> edition, University of The Sciences in Philadelphia, 2005, USA.
8. MSH/WHO. Managing Drug Supply, Kumarian Press, 1997, USA.

## **Communication skill for pharmacists course guide book/syllabus in Modular Approach**

**Course title: Communication skill for pharmacists**

**Course code: Phar 4172**

**Course EtCTS: 3**

Course hours: 3 (This course needs a total of  $3 \times 27 = 81$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 32 hours
- Home study : 27 hours
- Tutorial : 8 hours
- Project work/presentation : 8 hours
- Assessment : 6 hours

Pre-requisite if any: Basic Writing Skills

### *Course Description:*

This course introduces students with the basic concepts of communications, establishing pharmacist-patient relationship, practical skills in communication with patients, collaborative working relationship with other healthcare professionals, conflict management, and written communication skills.

### *Course objectives:*

After completion of this course students will be able to:

- ❖ Identify the importance of communication skills in meeting pharmacists' patient care responsibilities.
- ❖ Demonstrate competency in the use of interpersonal communication skills of listening, interviewing, providing feedback, and relationship development.
- ❖ Apply appropriate communication strategies to address barriers and handle sensitive issues in interactions with patients and health care professionals.
- ❖ Analyze the impact of elements of written, verbal, and e-communication on the practitioner image.

- ❖ Collaborate with peers in developing effective interpersonal communication skills required of a pharmacist.

| Day   | Chapters/topics/sub-topics  | Time allotted (hours) | Ref. |
|-------|---|-----------------------|------|
| Day 1 | 1. Patient-Centered Communication and Elements of Basic Communication         |                       | 1    |
|       | 1.1. What Is Communication?   | 1                     |      |
|       | 1.2. Principles and Elements of Interpersonal Communication                   | 2                     |      |
|       | 1.3. Perception in Professional Communication                                 | 2                     |      |
|       | 1.4. Nonverbal Communication in Pharmacy                                      | 2                     |      |
|       | 1.5. Barriers in Communication  | 2                     |      |
| Day 2 | 2. Establishing the pharmacist-patient relationship                           | 5                     | 1    |
|       | 2.1. Patient counseling   |                       |      |
|       | 2.2. Interviewing patients  | 3                     |      |
|       | 2.3. Educating patients   | 3                     |      |
| Day 3 | 2.4. Non-prescription medication consults                                     | 3                     | 1 -4 |
|       | 2.5. Communication about medicines with special patients and children         | 3                     |      |
|       | 2.6. Ethical issues in patient counseling                                     | 2                     |      |
|       | 3. Practical Skills for Pharmacists   |                       |      |
|       | 3.1. Listening and Empathic Responding  | 2                     |      |
| Day 4 | 3.1. Listening and Empathic Responding <b>continued</b>                       | 2                     |      |
|       | 3.2. Helping Patients Manage Therapeutic Regimens and Communication Regarding | 1                     |      |
|       | 3.3. Medication Safety Issues   | 3                     |      |
|       | 3.4. Assertiveness  | 4                     |      |
| Day 5 | 3.5. Interviewing and Assessment  | 4                     | 1    |
|       | 4. Interaction with other health professionals                                |                       |      |
|       | 4.1. Communications in Organizations  | 2                     |      |
|       | 4.2. Interviewing and Being Interviewed                                       | 2                     |      |

|       |   |   |          |
|-------|---|---|----------|
|       | 4.3. Small Group Communications                               | 2 |          |
|       | 4.4. Public Communication                                     | 3 |          |
| Day 6 | 5. Conflict management  | 4 | 9        |
|       | 5.1. Managing Conflict in Organizations                       |   |          |
|       | 6. Written communication skills                               |   | 1 – 3, 9 |
|       | 6.1. Note taking and documentation practices                  | 2 |          |
| Day 7 | 6.2. Correspondences  | 2 |          |
|       | 6.3. Developing patient education materials, newsletters, etc | 5 |          |
|       | 6.4. Preparing a patient case presentation                    | 3 |          |
| Day 8 | 6.5. Preparing a patient case presentation                    | 2 |          |
|       | 6.6. Preparing a journal club presentation                    | 4 |          |
| Day 9 | <b>Final exam</b>   |   |          |

### Mode of delivery:

This course is thought using a variety of instructional methods including:

- Illustrated Lectures
- Active learning methods (brain storming, buzz group, discussion, etc),
- Individual and group exercises and assignments
- Presentations
- Role play

### Mode of Assessment:

Continuous assessment & summative assessment

- Quizzes (15%)
- Assignment (10%)
- Tests (20%)
- Presentations (10%)
- Viva (10%)
- Final Exam (35%)

**References:**

1. Beardsley, R. S., Kimberlin C., Tindall, W. N., Communication Skills in Pharmacy Practice: A Practical Guide for Students and Practitioners, 4th Ed., Lippincott Williams & Wilkins, Pennsylvania, 2002.
2. Motivational Interviewing, Second Edition, Preparing People for Change (2002)
3. Motivational Interviewing in Health Care: Helping Patients Change Behavior (2007)
4. To Err is Human: Building a Safer Health System (2000) see link for reading below.
5. Whalley B. J., Fletcher K.E., Weston S.E., Howard R.L. and Rawlinson C.F., Foundation in Pharmacy Practice, Pharmaceutical Press, London, 2008.
6. Wiedenmayer K., Summers R.S., Mackie C.A., Gous A.G.S., Everard M. and Tromp D. Developing pharmacy practice, WHO/IPF, 2006.
7. Remington's Pharmaceutical Science, 21<sup>st</sup> ed., Lippincott Williams & Wilkins, Pennsylvania, 2006.
8. Winfield, A. J. and Richards, R. M. E. (eds.), Pharmaceutical Practice, 2nd ed., Churchill Livingstone, London, 1998.
9. Berger B. A., Communication Skills for Pharmacists: Building Relationships, Improving Patient Care, 2nd edition, American Pharmacists Association, Washington DC ,2005.
10. Cipolle Robert J., Strand Linda M., Morley Peter C., Pharmaceutical Care Practice, the McGraw-Hill Companies Inc., New York, 1998.

# Pharmacy Law & Ethics Course Syllabus

**Course title: Pharmacy Law & Ethics**

**Course code: Phar 4173**

**Course EtCTS: 3**

**Course hours:** 3 (This course needs a total of  $3 \times 27 = 81$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 32 hours
- Project work: 10hours
- Presentations=7 hours
- Tutorial: 5 hours
- Home study: 21 hours
- Assessment= 6 hours

Pre-requisite if any: - successful completion of the previous modules

## **Course Description:**

The course offers topics on principles of ethical decision making, health professional patient relationship, frameworks for ethical analysis, ethical theories, ethical principles and moral values, and ethical codes, laws, regulations and directives pertaining to pharmaceutical services internationally and in Ethiopia, product registration and licensing requirements, regulations related to narcotic and psychotropic drugs. Case-study practice scenarios will also be presented to allow students make pharmaceutical care decisions based upon ethico-legal reasoning.

Course Objectives:

Upon completion of the course, students will be able to:

- Explain the process of policy development and evaluation
- Identify laws governing the practice of pharmacy
- Describe the ethical principles in pharmacy practice of Ethiopia
- Identify standards and guidelines governing pharmacy practice in Ethiopia

Supporting objectives:

To meet this objective, student will be able to:

- Define pharmaceutical jurisprudence and Professional Ethics
- Discuss Laws Governing the practice of pharmacy
- Describe the Pharmaceutical legal system
- Describe Drug nomenclature and patents

- Explain about the requirements to practice pharmacy, and also to run health institutions involved in use and dispensing of pharmaceuticals
- Explain the Control of manufacture, import, export, whole sale, distribution, labeling and packaging, utilization, administration and quality assurance of pharmaceuticals
- Describe Management and use of controlled substances, poisons and radiopharmaceuticals
- Identify prohibitions; legal procedures for offences and penalties for violation of Pharmaceutical laws and regulations
- Discuss the Code of ethics for pharmacists in Ethiopia

| Week | Contact hrs | Topic/sub-topic/chapter   | Reading materials    | Remark |
|------|-------------|---|----------------------|--------|
| 1    | 2           | Part 1: Ethics<br>1. What is ethics?<br>2. Ethical theories <ul style="list-style-type: none"> <li>• Teleological (consequentialist) and</li> <li>• deontological (nonconsequentialist) theories</li> </ul> | Reference 1,2 8 & 16 |        |
| 2    | 2           | 3. Ethical principles and moral rules<br>☞ Autonomy; informed consent; confidentiality; beneficence/nonmaleficence; fidelity; distributive justice.   | Reference 1,2 & 8    |        |
| 3    | 2           | 4. Ethical issues in health care: Law and ethics; rationing; assisted suicide; human drug experimentation; drug formularies<br>5. Framework for ethical analysis  | Reference 1,2 & 16   |        |
| 4    | 2           | 5. Framework for ethical analysis .....   | Reference 1,2 & 16   |        |
| 5    | 2           | 6. Professional ethics  | Reference 1,2 8 & 16 |        |
| 6    | 2           | 7. Ethical codes FIP standards of ethical practices; code of ethics for pharmacists practicing in Ethiopia  | Reference 1,2 8 & 16 |        |
| 7    | 2           | 8. Standards of practice for pharmacists practicing in Ethiopia   | Reference 8          |        |
| 8    | 2           | 9. The health professional–patient relationship: Consumerism versus paternalism; patients’ rights; moral rights versus legal rights to health   | Reference 1,2 8 & 16 |        |

|    |   |   |                                  |  |
|----|---|---|----------------------------------|--|
|    |   | care; health care practitioners' duty to their patients.  |                                  |  |
| 9  | 2 | Part 2: Laws and Regulations<br>1. Laws Governing the Practice of Pharmacy<br>10.1 Food, Drugs and Cosmetics Act;<br>10.2 Narcotic Drugs and Psychotropic Substances Act.   | Reference 4,7 & 17               |  |
| 10 | 2 | 10.3 Drug Abuse Prevention;<br>10.4 Poisons Act;  | Reference 4, & 17                |  |
| 11 | 2 | 10.5 Tort Law: negligence, international torts, privacy, business premises liability,<br>10.6 Commercial Law: business, contract, agency, private product ownership, insurance plans and antitrust, advertising, etc.   | Reference 1,2, 3, 4&15           |  |
| 12 | 2 | <b>11. Pharmaceutical Laws and Regulations</b><br>11.1 Pharmaceutical legal systems (legislative, executive, judicial systems);<br>11.2 Drug nomenclature;<br>11.3 Labeling and packaging requirements of pharmaceuticals;<br>11.4 Administration/quality assurance;                              | Reference 1,2, 3 4,13,14,15 & 16 |  |
| 13 | 2 | 11.1 Control of fulfillment of requirements to practice pharmacy:<br>11.5.1 Pharmaceutical retail outlets,<br>11.5.2. Utilization of pharmaceuticals,<br>11.5.3 Manufacture of pharmaceuticals,<br>11.5.4 Import/export of pharmaceuticals,<br>11.5.5 Wholesale/ distribution of pharmaceuticals, | Reference 4,5,9,11 & 12          |  |
| 14 |   | 11.5.6 Health institutions involved in use and dispensing of pharmaceuticals,<br>11.5.7 Dispensing of proprietaries and manufacture of nostrums;<br>11.5.8 Management and use of controlled substances, poisons, radiopharmaceuticals; 11.5.8.1. Prohibitions;                                    | Reference 1,4, 7,9,10 & 12       |  |



|    |   |  |                              |  |
|----|---|--|------------------------------|--|
|    |   | clinical trials; legal procedures for offenses and penalties.  |                              |  |
| 15 | 2 | 12. Laws, regulations and directives pertaining to pharmaceutical services in Ethiopia:<br>12.1 product registration and marketing,<br>12.2 manufacturing, | Reference 1,4, 7,9,10 & 12   |  |
| 16 | 2 | 12.3 pharmaceutical promotions,<br>12.4 clinical trials,<br>12.5 herbal remedies,<br>12.6 veterinary drugs<br>12.7 professional licensing requirements     | Reference 1,4, 6,7,9,10 & 12 |  |

Mode of delivery:

- Illustrated Lectures
- Active learning methods (brain storming, buzz group, discussion, etc),
- Individual and group exercises and assignments
- Presentations
- Case study

**Mode of Assessment:**

- Quiz: 10%,
- Tests: 15%
- Assignment: 25%
- Presentation: 10%
- Final Exam: 40%

**Reference Materials:**

1. Remington's: The Science and Practice of Pharmacy, 21<sup>st</sup> edition, University of The Sciences in Philadelphia, 2005, USA.
2. Dale and Appelbe's Pharmacy Law and Ethics, 8<sup>th</sup> edition, Pharmaceutical Press, 2005, London.
3. De. Marco, C. T. Pharmacy & the law, Aspen Systems Corp., Rochville, MD, 1984.

4. Drug Administration and Control Proclamation No. No. 661/2009
5. Standards for the Establishment and Practice of Pharmaceutical Manufacturing Plant, Drug Administration and Control Authority, 2001, Addis Ababa.
6. Directive for the Regulation of Promotion and Advertisement of Drugs, Drug Administration and Control Authority, 2005, Addis Ababa.
7. Guideline to Control and Promote Proper Use of Narcotic Drugs and Psychotropic Substances, Drug Administration and Control Authority, 2004, Addis Ababa.
8. Code of Ethics and Standards of Practice for Pharmacists Practicing in Ethiopia, 2<sup>nd</sup> edition, Ethiopian Pharmaceutical Association, 2006, Addis Ababa.
9. Guidelines on the Requirements for the Registration of Pharmaceutical Manufacturers, Drug Administration and Control Authority, Addis Ababa.
10. Requirements and Guidelines for the Registration of Human Drugs, Drug Administration and Control Authority, Addis Ababa.
11. Drug Import and Wholesale Guidelines, DACA.
12. Drug Retail sale guidelines, DACA.
13. Fink III, J.I., Marquard K.W & Simonsmeir, KM, Pharmacy Law Digest, Facts and Comparison, St. Souio, MD 1998.
14. Pharmacoethics: A Problem-Based Approach (Pharmacy Education Series), David A. Gettman and Dean Arneson, CRC, 2003
15. Law, Liability & Ethics for the Medical Office Professional, Myrtle R. Flight, 4th edition, Delmar Cengage Learning, 2003.
16. Mappes, T.A., and Zembaty, J.S. (1991). Biomedical ethics (3rd ed.). New York, NY: McGraw-Hill.
17. US Food, Drug and Cosmetic Act , URL:  
<http://www.fda.gov/RegulatoryInformation/Legislation/FederalFoodDrugandCosmeticActFDCA/default.htm>

# Pharmacy Practice I course guide book/syllabus in Modular Approach

**Course title: Pharmacy Practice I**

**Course code: Phar 4174**

**Course EtCTS: 5**

**Course hours:** 5 (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 32 hrs
- Assignments: 15 hrs
- Presentations: 10 hrs
- Tutorial: 8 hrs
- Professional visit: 30 hrs
- Home study: 34 hrs
- Assessment: 6 hrs

Pre-requisite if any: successful completion of previous modules

## *Course Description:*

This course provides an extended theoretical discussion on pharmacy practice in class and visit of various pharmacy settings: community and hospital pharmacies, pharmaceutical industry, drug regulatory body, research institutes, drug supply and distribution agencies, and pharmacy associations. The course enables the student to comprehend the duties and responsibilities of various settings of pharmacy practice. It also prepares the student to develop good working relationships with other health care professionals, and participate in public health education.

## *Course objectives:*

Upon completing the course, students will be able to

- Describe and practice a broad range of pharmacy practice settings
- Perform the basic functions and/or skills assigned in various practice setting
- Describe the role and function of pharmacy professionals
- Demonstrate and understand pharmacy operations, Professional Activities, Roles and Responsibilities
- Conduct educational program for the community

| Day   | Chapters/ Topics/Sub - topics   | Allotted time (hrs) | Ref.      |
|-------|---|---------------------|-----------|
| Day 1 | 1. Introduction   | 1                   | 1         |
|       | 2. The pharmacist as a health care professional   |                     | 1 - 3     |
|       | 2.1. Evolution of professional pharmacy practice  | 2                   |           |
|       | 2.2. Concepts of profession and professionalism   | 2                   |           |
|       | 2.3. Relationships with other healthcare professions  | 2                   |           |
|       | 3. The community pharmacy   |                     | 1, 4, 5-6 |
|       | 3.1. Organization of a community pharmacy   | 3                   |           |
| Day 2 | 3.2. Services provided by the community pharmacy  |                     |           |
|       | 3.2.1 Essential services: good dispensing practice; dispensing non-prescription drugs; adverse drug reaction reporting; patient counseling; good compounding practice; responding to symptoms; public health; disposal of unwanted medications; medicines use review. | 7                   |           |
|       | 3.2.3 Other services: retailing; smoking cessation clinics; substance misuse; emergency hormonal prescriptions; advice to residential and care homes; health screening.   | 4                   | 7         |
| Day 3 | <b>Community pharmacy visit</b>   | <b>10</b>           |           |
| Day 4 | 4. Hospital Pharmacy  |                     |           |
|       | 4.1. Organization of a typical hospital pharmacy department   | 3                   |           |
|       | 4.2. Traditional roles of the hospital pharmacist   | 2                   |           |
|       | 4.3. Clinical pharmacy/pharmaceutical care: ward rounds and responsibilities; medication administration and monitoring; outpatient clinics (e.g. anticoagulant clinics)   | 4                   |           |
| Day 5 | 4.3. Specialization in hospital pharmacy:   |                     |           |
|       | 4.4.1. Clinical specialization;   | 4                   |           |
|       | 4.4.2. Pharmacy specialization (dispensary management for in- and outpatients; drug supply management drug information; quality assurance; sterile and non-sterile production; radiopharmaceuticals.  | 4                   |           |
| Day 6 | 4.5 Pharmacy and therapeutics committee; teaching   | 4                   |           |
|       | 4.5 Pharmacy and therapeutics committee; teaching   | 2                   |           |

|        |  |    |  |
|--------|--|----|--|
|        | 4.6 Management   | 3  |  |
| Day 7  | <b>Hospital pharmacy visit</b>   | 10 |  |
| Day 8  | 5. Other areas of pharmacy practice  |    |  |
|        | 5.1. Industrial pharmacy sector: organizational structure; manufacturing; quality assurance; research and development; sales and marketing; clinical trials; medicines information; regulatory affairs; general management and business. | 10 |  |
| Day 9  | 5.2. Drug regulation and control: product registration; facility inspection; quality control.  | 6  |  |
|        | 5.3. Other practice areas: drug supply and distribution; training; research; nuclear pharmacy practice; pharmaceutical association; etc.   | 8  |  |
|        | 6. Pharmacy health education<br>6.1. Dietary management, dental health care, contraception, smoking, excessive alcohol consumption and related problems, drug misuse, contact lens care  | 6  |  |
| Day 10 | Industry and regulatory institute visit  | 10 |  |
| Day 11 | <b>Final examination</b>   |    |  |

**Mode of delivery:**

- Illustrated Lectures and case studies
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments
- Presentations and participation in class discussion
- Professional visits

**Mode of Assessment:**

- Quizzes (15%)
- Assignments (15%)
- Professional visit report writing and presentations (25%)
- Tests (15%)
- Final exam (30%)

## References

1. Winfield, A. J. and Richards, R. M. E. (eds.), *Pharmaceutical Practice*, 2nd ed., Churchill Livingstone, London, 1998.
2. Deno, R. A., Rowe, T. D., Brodie, D. C. *The profession of Pharmacy, an Introductory Textbook*, 2nd ed. J. B. Lippincott Co., Philadelphia, 1966.
3. Smith, H. A. *Principles and Methods of Pharmacy Management*, 2nd ed. Lea & Febiger, Philadelphia, 1980.
4. Lawson, D. H. and Richards, R.H., (eds.) *Clinical Pharmacy and Hospital Drug Management*, 2<sup>nd</sup> ed. Chapman and Hall. London. 1982.
5. Hassan, W. E. Jr. *Hospital Pharmacy*, 5<sup>th</sup> ed. Lea and Febiger, Philadelphia, 1986.
6. *Remington's Pharmaceutical Science*, 21<sup>st</sup> ed., Lippincott Williams & Wilkins, Pennsylvania, 2006.
7. Peterson A. M. *Managing Pharmacy Practice: Principles, Strategies, and Systems*, CRC, Boca Raton, 2004.
8. Whalley, B. J., Fletcher K.E., Weston S.E., Howard R.L. and Rawlinson C.F., *Foundation in Pharmacy Practice*, Pharmaceutical Press, London, 2008.
9. Wiedenmayer K., Summers R.S., Mackie C.A., Gous A.G.S., Everard M. and Tromp D. *Developing pharmacy practice*, WHO/IPF, 2006.

## **Pharmacy Practice II course guide book/syllabus in Modular Approach**

**Course title: Pharmacy Practice II**

**Course code: Phar 4175**

**Course EtCTS: 5**

**Course hours: 5** (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Community pharmacy practice = 18 hours
- Hospital pharmacy practice = 18 hours
- Pharmaceutical industry = 18 hours
- Inpatient pharmacies = 26 hours
- Drug information center = 8 hours
- Drug quality assurance = 16 hours
- Seminar presentations = 10 hours
- Assignments and group work = 5 hours
- Home study = 10 hours
- Assessment = 6 hours

Pre-requisite if any: successful completion of previous modules

### ***Course Description:***

This course provides series of practical attachments on pharmacy practice, including: community and hospital pharmacies, pharmaceutical industry, and drug regulatory body and pharmacy associations. The course enables the student to assume the duties and responsibilities of various settings of pharmacy practice. It also enables the student to develop good working relationships with other health care professionals, and participate in public health education.

### ***Course objectives:***

- To enable students enhance their skill level in the different areas of community pharmacy.
- To deliver different pharmaceutical services at hospital pharmacy settings.

- To enable students develop competence in the production and quality assurance of pharmaceuticals
- Develop the capability to comfortably and confidently provide drug information to individuals and groups
- To control the quality of drugs, cosmetics, food and drinks.

#### Daily Schedule

| Days   | Area of practical attachment | Tasks  | Time              |
|--------|------------------------------|--|-------------------|
| 1 to 2 | Community pharmacies         | <ul style="list-style-type: none"> <li>• Dispensing</li> <li>• Compounding extemporaneous preparations</li> <li>• Patient counseling</li> <li>• Inventory control</li> <li>• Pharmacy education</li> </ul>   | 8:30am – 12:30 pm |
|        |                              |  | 1:30pm – 5:30 pm  |
| 3 to 4 | Hospital pharmacies          | <ul style="list-style-type: none"> <li>• Dispensing</li> <li>• Compounding extemporaneous preparations</li> <li>• Patient counseling</li> <li>• Inventory control</li> <li>• Pharmacy education</li> <li>• Patient care</li> <li>• ART pharmacy dispensing</li> </ul>  | 8:00am – 12:00 pm |
|        |                              |  | 1:30pm – 5:30 pm  |
| 5 to 7 | Inpatient pharmacy           | <ul style="list-style-type: none"> <li>• Distribution of drugs to the different wards</li> <li>• Practice unit dose drug dispensing to inpatients</li> <li>• Monitoring drug/food/disease interactions</li> <li>• Calculate different parenteral doses to be administered to patients</li> <li>• Monitoring appropriateness of therapy</li> <li>• Participate in morning sessions and ward visits</li> </ul> | 8:00am – 12:00 pm |
|        |                              |  | 1:30pm – 5:30 pm  |
| 8 to 9 | Pharmaceutical industry      | <ul style="list-style-type: none"> <li>• Tablet Production line</li> <li>• Capsule Production line</li> <li>• Oral Liquid Production line</li> <li>• Parenteral Liquids Production line</li> <li>• Topical dosage forms/Ointments, Creams/ Production line</li> <li>• Quality Control Laboratory</li> </ul>  | 8:30am – 12:00 pm |
|        |                              |  | 1:30pm – 5:30 pm  |
| 10     | Drug information center      | <ul style="list-style-type: none"> <li>• Receive and respond drug information queries</li> <li>• Perform literature searches from different Databases</li> </ul>   | 8:30am – 12:00 pm |
|        |                              |  | 1:30pm – 5:30 pm  |



|          |                         |   |                   |
|----------|-------------------------|---|-------------------|
| 11 to 12 | Drug quality assurance  | <ul style="list-style-type: none"><li>• <b>Participate in</b> evaluating the safety, efficacy and quality of pharmaceuticals</li><li>• Participate in disposal pharmaceuticals unfit for use</li><li>• <b>Perform physicochemical and microbiological drug quality analysis</b></li></ul> | 8:30am – 12:00 pm |
|          |                         |   | 1:30pm – 5:30 pm  |
| 13       | Final examinations exam |   |                   |

#### **Delivery mode:**

- Practice
- Presentations and discussions

#### **Mode of Assessment:**

- Competence at practice including oral exam: 40%
- Attendance: 5%
- Seminar presentations: 15%
- Assignment: 10%
- Written exam: 30%

#### **References**

1. Winfield, A. J. and Richards, R. M. E. (eds.), Pharmaceutical Practice, 2nd ed., Churchill Livingstone, London, 1998.
2. Smith, H. A. Principles and Methods of Pharmacy Management, 2nd ed. Lea & Febiger, Philadelphia, 1980.
3. Lawson, D. H. and Richards, R.H., (eds.) Clinical Pharmacy and Hospital Drug Management, 2<sup>nd</sup> ed. Chapman and Hall. London. 1982.
4. Remington's Pharmaceutical Science, 21<sup>st</sup> ed., Lippincott Williams & Wilkins, Pennsylvania, 2006.
5. National standard treatment guidelines and formularies.

## **First AID**

**Course title: First aid**

**Course code: Nurs 4176**

**Course EtCTS: 3**

**Course hours:** 3 (This course needs a total of  $3 \times 27 = 81$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture= 28 hours
- Assignments= 8 hrs
- Demonstration and role play =20hrs
- Video show=6hrs
- Tutorial: 4 hrs
- Home study: 10 hrs
- Assessment: 4 hrs

Pre-requisite : Anatomy and physiology

### *Course Description:*

This First aid and accident prevention course is designed for BSc degree pharmacy students as a competent provider of victims in emergency situation and also helps the students to avoid hazards to self and others. The basic first aid and accident prevention skill and knowledge and attitude required to sustain human body function and/or prevent premature death will be discussed, demonstrated and through independent home study and applied in and out of health care settings.

### *Course objectives:*

After completion of this course, the student will be able to apply knowledge and skill of first and accident prevention anywhere.

#### Supportive objectives

At the end of each topic the student will be able to

- Define first aid and accident prevention.
- Explain principles of first Aid
- Identify the respiratory emergency and artificial respiration
- Discuss cardiac arrest and cardiopulmonary resuscitation
- Identify the wound, types of bleeding and arrest bleeding
- Explain dressing and bandages
- Discuss injuries and caring for the causality with shock, suddenly illness
- Determine the importance of lifting and transporting of casualty safety
- Determine first aid approach for fracture, poisoning and disaster.
- Demonstrate artificial respiration, CPR, bleeding control.
- Differentiate between what to do and what not to do

| WEEK/DAT<br>E | TOPIC   | Contact<br>hours | Assignments<br>due           | Reading<br>material | Remark |
|---------------|---|------------------|------------------------------|---------------------|--------|
| Week 1        | <ul style="list-style-type: none"> <li>▪ Define first aid and accident prevention</li> <li>▪ Identify reasons for First Aid</li> <li>▪ Explain principles of first aid</li> <li>▪ List value of First Aid Training</li> <li>▪ Define infection prevention and patient safety</li> <li>▪ Adopt general directions for given first aid</li> </ul>   |                  | Assignment 1                 | References          |        |
| Week 2-4      | <ul style="list-style-type: none"> <li>✓ Definition respiratory Emergency</li> <li>✓ Cause of Respiratory failure <ul style="list-style-type: none"> <li>♣ Anatomic obstruction</li> <li>♣ Mechanical obstruction</li> <li>♣ Air depleted of oxygen or containing toxic gases</li> </ul> </li> <li>✓ Artificial respiration</li> <li>✓ Cardiac arrest</li> <li>✓ Cardiopulmonary resuscitation</li> </ul> |                  | Case study, Re-demonstration | References          |        |
| Week 5-6      | <ul style="list-style-type: none"> <li>✚ Define wound</li> <li>✚ Wound classification based on skin integrity and cause</li> <li>✚ List types of open wound</li> <li>✚ Common causes and symptoms wound infection</li> <li>✚ First Aid for open wounds</li> <li>✚ First aid for severe bleeding</li> <li>✚ Prevention of contamination and infection of wounds</li> </ul>                                 |                  | Asinment.2                   |                     |        |
| Week 7        | <ul style="list-style-type: none"> <li>➤ Definition of dressings</li> <li>➤ Principles of clean dressing</li> <li>➤ Bandages</li> <li>➤ Types of commercially available bandages</li> <li>➤ Application of bandages</li> <li>➤ First Aid kits and supplies</li> </ul>   |                  | Re-Demonstration.            |                     |        |
| Week 8-11     | <ul style="list-style-type: none"> <li>➤ Eye injuries</li> <li>➤ Head injuries</li> <li>➤ Neck injuries</li> <li>➤ Open Wounds of the chest</li> <li>➤ Abdominal injures</li> <li>➤ Burns</li> <li>✚ Definition</li> <li>✚ Causes and effects</li> <li>✚ Classification based on Extent and location</li> <li>✚ First aid measures</li> <li>✚ Prevention of heat emergencies</li> </ul>                   |                  | Case study 2                 | References          |        |

|            |   |  |                                 |            |  |
|------------|---|--|---------------------------------|------------|--|
| Week 12-13 | <ul style="list-style-type: none"> <li>☞ Definition of shock</li> <li>☞ Cause of shock</li> <li>☞ Sign and symptoms</li> <li>☞ Treatment objectives</li> <li>☞ First aid measures</li> <li>☞ Sudden illness <ul style="list-style-type: none"> <li>❖ Heart attack</li> <li>❖ Stroke</li> <li>❖ Fainting</li> <li>❖ Epilepsy</li> <li>❖ Prevention of heart attack</li> </ul> </li> <li>○ Unconsciousness</li> </ul> |  | Case study                      | References |  |
| Week 14    | <ul style="list-style-type: none"> <li>▪ Definitions</li> <li>▪ Fractures</li> <li>▪ Dislocation</li> <li>▪ Sprains</li> <li>▪ Prevention of Accidents resulting in skeleton &amp; muscular injuries</li> </ul> <p>Pro.8.</p>   |  | Assignment<br>Re-Demonstration. | References |  |
| Week 15    | <ul style="list-style-type: none"> <li>☞ Definition</li> <li>☞ Causes</li> <li>☞ Sign and Symptoms</li> <li>☞ Objective in treatment of first aid</li> <li>☞ Contact poisons</li> <li>☞ Prevention of Accidental poisoning</li> </ul> <p>Procedure.9</p>  |  | Case study,                     | References |  |
| Week 16    | <ul style="list-style-type: none"> <li>🚒 Define disaster</li> <li>🚒 Types of disaster</li> <li>🚒 Prevent disaster</li> </ul>  |  | Assignment                      | References |  |

### Mode of delivery:

- Lecture
- Discussion
- Demonstration and role play
- Video show

### Teaching aids and materials (course logistics)

- Human Anatomic Models/dolls
- Demonstration equipment and Instruments

- Chalk and board, white board
- Audiovisual aid (LCD, OHP, Laptop)

### **Mode of Assessment:**

#### Formative assessment

- Attendance and class activity
- Practical exam (skill lab)
- Assignment
- Quiz

#### Summative assessment

|                                 |      |
|---------------------------------|------|
| i. Continuous assessment        |      |
| Assignments                     | 10%  |
| Test                            | 30%  |
| ii. Written final exam          | 40%  |
| iii. Practical exam (skill lab) | 20%  |
| Total                           | 100% |

#### Course policy:

- A student who is unable to pass 50% of the continuous assessment should not be allowed to sit for final exam
- Attendance:
  - The student who is absent from over 20% of the contact hours should not be eligible for final examination and is enforced to repeat the course
  - 100% attendance for practical/skill/lab hours

#### *Reference*

1. Skeet, M. First Aid for Community health worker to developing countries. Macmillan/tong Kong 1984.
2. American Red Cross standard first Aid and Personal Safety, 2<sup>nd</sup> ed. New York 1979.
3. Caroline L. Nancy. Emergency care in the streets U.S.A. 19979.
4. Warner. C. Germanie. Emergency cares Assessment and intervention 3<sup>rd</sup> Ed. The C.V Mosey Comp. London 1983
5. Infection prevention and patient safety guideline of Ethiopia.

## **Nutrition**

**Course title:** Nutrition

**Course code:** Com-H 4177

**Course EtCTS:** 3

**Course hours:** 3 (This course needs a total of  $3 \times 27 = 81$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture= 32 hrs
- Tutorial=4 hrs
- Group/practical work/hospital visit=9 hrs
- Assignment and presentations= 10 hrs
- Home study= 20 hrs
- Assessment= 6 hrs

Pre-requisite if any: successful completion of previous modules

### *Course Description:*

This human nutrition course is designed to prepare Bachelor of pharmacy students in order to be competent in nutrition related to health and disease. The course is designed to introduce students to normal nutrition, diet therapy, infant & child and maternal nutrition. It helps the students to identify different nutrients and to be competent in assessing and managing nutrition and nutrition related problems in the community and for women, children and PLWHA in particular. It also helps students to recognize public importance of ensuring food safety and quality.

### **Course Objectives:**

After completion of this course, the student will be able to recognize essential nutrients for life function, develop skill on nutritional assessment methods, recognize nutritional intervention methods and also able to apply them in promotion of health and in the care of the sick in an effective and integrated manner.

### **Supporting objectives:**

At the end of this course, the students will be able to:

- Explain the historical development of nutrition

- Describe the characteristics and types, physiological functions, and food sources of essential nutrients
- Explain recommended intakes and the adverse effects of both inadequate and excessive intake of nutrients
- Describe the epidemiology, population at risk, classification, clinical feature and management of malnutrition
- Analyze and develop skill on the major nutritional assessment methods
- Discuss infant and young child feeding options
- Describe the public health importance nutritional deficiency states in Ethiopia
- Integrate maternal nutrition with other programs and services
- Describe the management algorithm for HIV patients with malnutrition
- Describe the importance and application of nutritional surveillances
- Prevent micronutrient deficiencies through active participation in micronutrient supplementation programs and control of common infections such as malaria and helmenthiasis
- Control micronutrient deficiencies through proper therapeutic supplementation with micronutrients
- Discuss the public health importance of ensuring food safety and quality in terms of protection from microbiological hazards, pesticide residues, misuse of food additive, chemical contaminants, biological toxins (national toxins in foods), and adulteration

### Course schedule

| Week/date | Lesson/ Topics   | Teaching methods   | Duties expected from instructor  | Duties expected from students   | Assignments due/evaluation           | Required readings  |
|-----------|--|--|--|---|--------------------------------------|--|
| Day 1     | Introduction to nutrition <ul style="list-style-type: none"> <li>• Historical development of nutrition</li> <li>• Terminologies</li> <li>• Growth and development</li> </ul> | Exercise<br><br>Brain storming<br><br>Illustrated and interactive lectures | <ul style="list-style-type: none"> <li>• Introducing the objective of the lesson</li> <li>• Give class ,home and library works</li> <li>• Monitor students activities</li> <li>• Give gap</li> </ul> | Grasping lesson objectives<br><br>Participating in activities<br><br><b>In class room:</b><br><br>Discussing with | Project work<br><br>Group assignment | <ul style="list-style-type: none"> <li>• Melkie E, Human nutrition lecture note</li> <li>• Tefera</li> </ul> |

|       |   |   |  |   |   |  |
|-------|---|---|--|---|---|--|
|       | <ul style="list-style-type: none"> <li>Consequences of malnutrition</li> <li>Major factors contribute to malnutrition.</li> </ul> | Group discussion  | <ul style="list-style-type: none"> <li>lectures</li> <li>Give concluding remarks</li> </ul>  | <p>groups on factors that can affect nutrition</p> <p><b>Outside class room:</b></p> <p>Library work: read books on historical development of nutrition, terminologies used in nutrition</p>  |   | B. nutrition lecture note  |
| Day 2 | <p><b>Carbohydrates, Proteins Lipids</b></p> <p>Functions, Types, Food Sources, Digestion, Absorption, metabolism, RDA</p>        | <p>Exercise</p> <p>Brain storming</p> <p>Illustrated and interactive lectures</p> <p>Group discussion</p> | <ul style="list-style-type: none"> <li>Introducing the objective of the lesson</li> <li>Asking brainstorming questions</li> <li>Give class ,home and library works</li> <li>Monitor students activities</li> <li>Give gap lectures</li> <li>Give concluding remarks</li> </ul> | <p>Grasping lesson objectives</p> <p>Participating in activities</p> <p><b>In class room:</b></p> <p>Discussing with groups on food sources of CHO's and proteins</p> <p><b>Outside class room:</b></p> <p>Library work: read books on carbohydrates and proteins</p> | <p>Quiz 1</p> <p>On previous lesson</p> | <ul style="list-style-type: none"> <li>Tefera B &amp; Melkiese, human nutrition lecture notes</li> <li>Dudek, nutrition handbook for nursing practice</li> </ul> |
| Day 3 | <p><b>Vitamins, Minerals</b></p> <p>Functions, Types, Food Sources, Digestion, Absorption,</p>                                    | <p>Exercise</p> <p>Brain storming</p> <p>Illustrated and interactive lectures</p> <p>Group</p>            | <ul style="list-style-type: none"> <li>Introducing the objective of the lesson</li> <li>Asking brainstorming questions</li> <li>Give class ,home and library works</li> <li>Monitor students</li> </ul>  | <p>Grasping lesson objectives</p> <p>Participating in activities</p> <p><b>In class room:</b></p> <p>Discussing with groups on types and</p>  | <b>Exam one</b>                         | <ul style="list-style-type: none"> <li>Melkie Edris, Tefera B. Human nutrition lecture notes</li> </ul>  |





|         |   |  |  |   |                       |  |
|---------|---|--|--|---|-----------------------|--|
|         |   |  | lectures <ul style="list-style-type: none"> <li>• Give concluding remarks</li> </ul>   | <b>room:</b><br>Library work: read books on nutritional deficiencies common in Ethiopia   |                       | of micronutrient deficiency ,FMOH, June 2004<br><br>Management of SAM: A manual for physicians and other senior health Workers WHO, Geneva, 1999 |
| Day 6-7 | Nutritional deficiency states continued<br><br>Nutritional assessment: <ul style="list-style-type: none"> <li>• Anthropometry</li> <li>• Biochemical method</li> <li>• Clinical method</li> <li>• Dietary survey method</li> </ul> Prevention and control | Exercise<br><br>Brain storming<br><br>Illustrated and interactive lectures<br><br>Group discussion | <ul style="list-style-type: none"> <li>• Introducing the objective of the lesson</li> <li>• Give class ,home and library works</li> <li>• Monitor students activities</li> <li>• Give gap lectures</li> <li>• Give concluding remarks</li> </ul> | Grasping lesson objectives<br><br>Participating in activities<br><br><b>In class room:</b><br><br>Discussing on methods of nutritional assessment<br><br>Practice methods of assessment<br><br><b>Outside class room:</b><br><br>Library work: read books on nutritional assessment | Quiz 3<br>(Summative) | Teferra.B Human nutrition lecture note<br><br>Gibson, principles of nutritional assessment ,oxford, 1990   |

|           |  |   |   |  |                   |   |
|-----------|--|---|---|--|-------------------|---|
| Day 8-9   | <p>Nutritional deficiency states continued</p> <ul style="list-style-type: none"> <li>• Diet as therapeutic agent</li> <li>• Diet and the patient</li> <li>• Hospital diets</li> </ul> | <p>Exercise</p> <p>Brain storming</p> <p>Illustrated and interactive lectures</p> <p>Group discussion</p> | <ul style="list-style-type: none"> <li>• Introducing the objective of the lesson</li> <li>• Asking brain storming questions</li> <li>• Give class ,home and library works</li> <li>• Monitor students activities</li> <li>• Give gap lectures</li> <li>• Give concluding remarks</li> </ul> | <p>Grasping lesson objectives</p> <p>Participating in activities</p> <p><b>In class room:</b></p> <p>List and discuss fluid diets</p> <p>Special diets with related to disease</p> <p><b>Outside class room:</b></p> <p>Library work: read books on factors affecting human food selection</p> | <b>Exam three</b> | <ul style="list-style-type: none"> <li>• Melkie Edris, Human nutrition lecture note</li> <li>• Dudek, nutrition hand book for nursing practice</li> </ul>   |
| Day 10-11 | <p>Nutritional care and support for PLHIV</p>  | <p>Brain storming</p> <p>Illustrated and interactive lectures</p> <p>Group discussion</p>                 | <ul style="list-style-type: none"> <li>• Introducing the objective of the lesson</li> <li>• Asking brain storming questions</li> <li>• Give class ,home and library works</li> <li>• Monitor students activities</li> <li>• Give gap lectures</li> <li>• Give concluding remarks</li> </ul> | <p>Grasping lesson objectives</p> <p>Participating in activities</p> <p><b>In class room:</b></p> <p>Discussing on HIV and Nutrition</p> <p><b>Outside class room:</b></p> <p>Home work: read updated national guideline for HIV/AIDS and nutrition</p>  | Quiz 4 formative  | <ul style="list-style-type: none"> <li>• Melkie Edris and Tefera B Human nutrition lecture notes</li> <li>• FMOH : National guidelines for HIV/AIDS and Nutrition, 2008</li> <li>• Nutriti</li> </ul> |

|            |  |  |   |  |  |  |
|------------|--|--|---|--|--|--|
|            |  |  |   |  |  | on and HIV/AIDS A Training Manual For Nurses and Midwives, updated on 2010   |
| Day 12-13  | <b>Nutritional interventions</b> for major nutritional problems in Ethiopia<br><br>Methods, mechanisms and criteria,<br><br>Essential Nutrition Actions(ENA)<br><br><b>Teaching Good nutrition</b> | Brain storming<br><br>Illustrated and interactive lectures<br><br>Group discussion                 | <ul style="list-style-type: none"> <li>Introducing the objective of the lesson</li> <li>Asking brain storming questions</li> <li>Give class ,home and library works</li> <li>Monitor students activities</li> <li>Give gap lectures</li> <li>Give concluding remarks</li> </ul> | Grasping lesson objectives<br><br>Participating in activities<br><br><b>In class room:</b><br><br>Discussing with groups about ENA<br><br><b>Outside class room:</b><br><br>Library work: read books on nutritional intervention methods | Home take assignment and<br><br>Group presentation | <ul style="list-style-type: none"> <li>Tefera B. Human nutrition lecture note</li> <li>ENA counselor guide, FMOH , revised January 2005</li> </ul> |
| Day 14- 15 | The quality and safety of nutrition related products   | Exercise<br><br>Brain storming<br><br>Illustrated and interactive lectures<br><br>Group discussion | <ul style="list-style-type: none"> <li>Introducing the objective of the lesson</li> <li>Asking brain storming questions</li> <li>Give class ,home and library works</li> <li>Monitor students activities</li> <li>Give gap lectures</li> </ul>                                  | Grasping lesson objectives<br><br>Participating in activities<br><br><b>In class room:</b><br><br>Discussing with groups on the public health importance of ensuring food safety and quality in terms                                    | Quiz 5<br><br>(Summative)<br><br>presentation      | <ul style="list-style-type: none"> <li>Melkie Edris and Tefera B Human nutrition lecture notes</li> </ul>  |

|        |  |                                       |  |   |                     |  |
|--------|--|---------------------------------------|--|---|---------------------|--|
|        |  | Role play<br><br>Seminar presentation | <ul style="list-style-type: none"> <li>• Check students work</li> <li>• Give concluding remarks</li> </ul> | of protection from microbiological hazards, pesticide residues, misuse of food additive, chemical contaminants, biological toxins (national toxins in foods), and adulteration<br><br><b>Outside class room:</b><br><br>Library work: read books on food safety and quality |                     |  |
| Day 16 |  |                                       |  |   | Final Exam<br>(50%) |  |

#### Mode of delivery:

- ❖ Brain storming
- ❖ Illustrated and interactive lectures
- ❖ Group discussion
- ❖ Case study
- ❖ Individual and group exercises
- ❖ Seminar/ presentation

#### Mode of Assessment:

- Exercises
- Quizzes
- Individual assignment
- Presentation

#### Summative assessment

Quizzes \_\_\_\_\_10%

Group and individual assignment-----20%

Tests -----20%

Presentation .....10%

Final exam-----40%

### **Learning materials:**

- Printed materials (text books, manual exercises, learning guides, handout)

#### **Text Books:**

1. Melkie Edris, Human Nutrition for Health Science students, Gondar University, 2004.
2. Tefera Belachew. Human Nutrition for health science students. Lecture note series. Jimma University, Faculty of Public Health, January 2003.

### **References:**

1. Dudek S.G., Nutrition hand book for nursing practice, third ed Lippincott, Newyork, 1997
2. FMOH: Protocol for management of sever acute malnutrition(SAM) in Ethiopia, 2007
3. Human energy requirements Report of a Joint FAO/WHO/UNU Expert Consultation Rome, 17–24 October 2001
4. Management of severe Malnutrition: A manual for physicians and other senior health Workers WHO,Geneva,1999
5. FMOH: National guidelines for HIV/AIDS and Nutrition,2008
6. Nutrition and HIV/AIDS A Training Manual For Nurses and Midwives, updated on 2010
7. National nutrition guideline
8. ENA counselor guide, FMOH, revised January 2005
9. National guideline for control and prevention of micronutrient deficiency ,FMOH, June 2004
10. Gibson, principles of nutritional assessment ,oxford,1990

## **Module 18: Professional Elective**

**Module Name: Professional Elective (Pharmaceutical Manufacturing)**

**Module Category:** Elective

**Module Code:** Phar-M4182

**Module Number:** 18

**Module Weight:** 5 EtCTS

**Course:**

- Introduction to Pharmacoepidemiology (Phar4181) (5 EtCTS)
- Phytochemistry (Phar4182) (5 EtCTS)
- Pharmaceutical Manufacturing (Phar4183) (5 EtCTS)
- Pharmacogenetics (Phar4184) (5 EtCTS)
- pharmaceutical QA and QC (Phar4185) (5 EtCTS)

### **Module description**

This module is designed to help students to choose their field of interest from the courses included in it and become aware of their future reliance on that area after they accomplish other courses needed to fulfill Bachelor of pharmacy degree. It is designed by clustering manufacturing, introduction to pharmacoepidemiology, pharmacogenetics, phytochemistry and pharmaceutical QA and QC.

### **Module objectives**

After the completion of this module the student will be able to:

- Describe traditional and advanced drug delivery systems.
- Explain pharmacoepidemiology and drug safety and research application for post-marketing drug safety surveillance
- Have advanced knowledge of the genetic basis for variable drug responses.
- Describe different extraction processes of constituents from plant materials and explain their structural elucidation, chemistry, nomenclature, source and importance
- Describe the quality aspects of pharmaceuticals starting from their production to consumption

### **Module Competency**

**Module Mode of Delivery:**

- Block

**Module Learning Teaching Method**

- Illustrated lectures and discussions, student research project, field trip, individual and group exercises and assignments presentation, guided reading

**Time Allocation**

- Lecture: 48hrs
- Field visit: 15hrs
- Home Study: 42hrs
- Project Work: 20hrs
- Presentation: 10hrs

**Module Assessment Techniques**

- Tests/quizzes
- Assignments (Group and/or individual)
- Presentation
- Journal club
- Final exam



## Introduction to Pharmacoepidemiology Course Syllabus

**Module name: Professional electives**

**Module Number in which the course exists: 18**

**Course title: Introduction to Pharmacoepidemiology**

**Course code: Phar 4181**

**Course EtCTS: 5**

**EtCTS credits: 5** (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 48 hours
- Project work: 14 hours
- Presentations=10 hours
- Case studies/journal club=10 hours
- Tutorial: 8 hours
- Home study: 38 hours
- Assessment=7 hours

Pre-requisite if any: Successful completion of pre-requisite modules

### *Course Description*

The goal of the course is to introduce pharmacoepidemiology and drug safety and research application for post-marketing drug safety surveillance. The course will describe how to develop a research protocol and conduct a research, describe various health care data sources used for research, and discuss how pharmacoepidemiology contribute to pharmacy practice, such as, drug utilization review, assessment of drug therapy, and adverse drug reaction monitoring. A series of case studies from thalidomide to cisapride to cerivastatin will be also discussed in class. Students can have a better understanding of Pharmacoepidemiologic research, drug safety regulatory, pregnancy registry, and risk management.

q. Course Objective:

Upon completion of this course, the students will be able to:

- ☞ Describe the purposes and scope of pharmacoepidemiology
- ☞ Describe and explain basic concepts in pharmacoepidemiology and its relevance for public health and for health policy making.
- ☞ Describe the relationship between national drug policies and Pharmacoepidemiology
- ☞ Describe the basic pharmacoepidemiologic concepts and measures of drug-related occurrence and its effect in population;
- ☞ Discuss common study designs and methods used in pharmacoepidemiological studies.

- ☞ Explain the applications of pharmacoepidemiological methods for studies of effects and adverse effects of drugs and economic consequences.
- ☞ Assess the relevance and limitations of various pharmacoepidemiological research designs
- ☞ Describe systems for the reporting of adverse effects and their use for pharmacoepidemiology.
- ☞ Apply pharmacoepidemiologic principles in practice.
- ☞ Discuss Pharmacovigilance in drug development
- ☞ Evaluate drug safety case studies and policy implications based on the medical and pharmacy literature.

Skills and abilities:

On successful completion of the course, the student should be able to:

- ☞ Review and evaluate pharmacoepidemiological studies.

| Week | Contact hrs | Topic/sub-topic/chapter   | Reading materials  | Remark |
|------|-------------|---|--------------------|--------|
| 1    | 4           | 1. Introduction<br>1.1. What is Pharmacoepidemiology?<br>1.2. Contributions of Pharmacoepidemiology   | Reference 2 & 4    |        |
| 2    | 4           | 2. National medicinal drug policies: their relationship to Pharmacoepidemiology   | Reference 2, 3 & 4 |        |
| 3    | 4           | 3. National medicinal drug policies: their relationship to Pharmacoepidemiology.....<br>3 Premarketing applications of Pharmacoepidemiology             | Reference 1&2      |        |
| 4    | 4           | 2. Study Designs<br>4.1 Observational studies   | Reference 2,3 & 4  |        |
| 5    | 4           | 4.1.1 Descriptive studies   | Reference 2,3 & 4  |        |
| 6    | 4           | 4.1.2 Analytical studies  | Reference 2,3 & 4  |        |
| 7    | 4           | 4.2 Experimental studies<br>4.2.1 Randomized Clinical Trial (RCT)   | Reference 2,3 & 4  |        |
| 8    | 4           | 4.2.2 Community Intervention Trails (CITs)<br>4.3 Selection of study designs  | Reference 2,3 & 4  |        |
| 9    | 4           | 5. Drug Utilization<br>5.1 Definition<br>5.2 Drug-centered and patient-centered approach in drug use studies  | Reference 2,3 & 4  |        |
| 10   | 4           | 5.3 Indicator based approach in drug use studies<br>5.3.1 Prescribing indicators<br>5.3.2 Patient care indicators<br>5.3.3 Facility specific indicators | Reference 2,3 & 4  |        |
| 11   | 4           | 5.4 The social aspects of drug us   | Reference 2,3 & 4  |        |

|    |   |   |                     |  |
|----|---|---|---------------------|--|
| 12 | 4 | 5.5 The economic aspects of drug use  | Reference 1,2,3 & 4 |  |
| 13 |   | 5.6 Studies of patient compliance   | Reference 1,2,3 & 4 |  |
| 14 | 4 | 7 Pharmacovigilance<br>7.2 What is pharmacovigilance?                                   | Reference 2,3 & 4   |  |
| 15 |   | 6.3 Pharmacovigilance methods   | Reference 1,2,3 & 4 |  |
| 16 | 4 | 6.4 The need for effective drug safety programs<br>6.4 Elements of drug safety programs | Reference 1,2 & 3   |  |

### **Mode of delivery:**

- Illustrated Lectures and case studies
- Active learning methods (brain storming, buzz group, discussion, etc)
- Individual and group exercises and assignments
- Presentations and participation in class discussion
- Case studies

### **Mode of assessment:**

- Quizzes and tests: 30%
- Attendance : 5%
- Case studies:5%
- Assignments (group or individual):20%
- Written final exam: 40%

### **LEARNING MATERIALS:**

- Recommended Readings:
  1. Pharmacoepidemiology, 4<sup>th</sup> edition, Storm B. L. (Ed), John Wiley and Sons Ltd, England, 2005.
  2. Textbook of Pharmacoepidemiology, Storm B. L. And Kimmel S.E. (Eds), 2007, John Wiley, New Jersey.
  3. Pharmacoepidemiology – An Introduction, 3<sup>rd</sup> edition, Hartzema A.G., Porta M., Tilson H.H., (Eds), 1998, Cincinnati OH, Harvey Witney Books Company.
  4. Remington's: The Science and Practice of Pharmacy, 21<sup>st</sup> edition, University of The Sciences in Philadelphia, 2005, USA.

**Module name: Professional electives**

**Module Number in which the course exists: 18**

**Course title: Photochemistry**

**Course code: Phar 4182**

**Course EtCTS: 5**

**EtCTS credits: 5** (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lecture: 48 hours
- Practical/laboratory sessions: 16hrs
- Assignments and Seminar presentations: 10 hrs
- Home based study: 51 hours

Pre-requisite if any: Successful completion of pre-requisite modules

**Course description:**

The course deals with different plant materials which have medicinal value. It gives emphasis on extraction of constituents from plant materials and study about their structural elucidation, chemistry, nomenclature, source and their importance. The course covers extraction techniques, carbohydrates, glycosides, vitamins, steroids, plant hormones, terpenoids, antibiotics, natural pigments, proteins, peptides, amino acids, alkaloids, purines, and different analytical techniques for identification and quantification of these natural products.

**Course objectives:**

At the end of the course, the student will be able to:

- ✓ Describe the principles of extraction techniques in phytochemistry.
- ✓ Describe the Classification, Nomenclature, Source, importance, Structure, chemistry and structural elucidation of different chemical which are plant origin
- ✓ Explain the role of natural products as potential for new drug discovery.
- ✓ Describe the principles and applications of different analytical techniques like chromatography, and spectroscopy which are used in phytochemistry.
- ✓ Describe the concept of stereoisomerism by taking examples of natural products

**Schedule of chapters/topics/subtopics, allotted time and reference materials for each topic**

| Day   | Chapters and topics/subtopics   | Allotted time (hrs) | References |
|-------|---|---------------------|------------|
| One   | <b>Chapter one: Extraction:</b>   | <b>16</b>           |            |
|       | Introduction  | <b>1</b>            |            |
|       | Definition  | <b>1</b>            |            |
|       | Factors influencing the choice of extraction  | <b>3</b>            |            |
|       | Principles of extraction methods  | <b>3</b>            |            |
|       | Types of extraction   | <b>2</b>            |            |
| Two   | Selection and Purification of Solvents For Extraction.  | <b>3</b>            |            |
|       | Methods of isolation  | <b>3</b>            |            |
|       | <b>Chapter two: carbohydrates, glycosides and vitamins</b>  | <b>18</b>           |            |
|       | <b>Carbohydrates:</b><br>Introduction, Definition, Classification, Nomenclature, Source and importance                | <b>4</b>            |            |
| Three | Structure , chemistry and structural elucidation of Glucose & Sucrose.  | <b>2</b>            |            |
|       | <b>Glycosides:</b><br>Introduction, Definition, Classification, Nomenclature, Source and importance                   | <b>4</b>            |            |
|       | Structure , chemistry and structural elucidation of cardiac glycosides - digoxin, Anthracene glycosides - Sennosides. | <b>2</b>            |            |
|       | <b>Vitamins:</b><br>Introduction, Definition, Classification , Nomenclature, Source and importance,                   | <b>2</b>            |            |
|       | Introduction, Definition, Classification , Nomenclature, Source and importance,                                       | <b>1</b>            |            |
| Four  | Structure , chemistry and structural elucidation of Ascorbic acid.  | <b>3</b>            |            |
|       | <b>Chapter three: steroids and plant hormones</b>   | <b>13</b>           |            |
|       | <b>Steroids:</b><br>Introduction, Definition, Classification, Nomenclature, Source, and                               | <b>4</b>            |            |
|       |   |                     |            |

|       |   |    |  |
|-------|---|----|--|
|       | importance  |    |  |
|       | Structure, chemistry, structural elucidation of cholesterol.  | 2  |  |
| Five  | <b><i>Plant Hormones:</i></b><br>Introduction, Definition, Classification, Nomenclature, Source, and importance     | 4  |  |
|       | Structure, chemistry, structural elucidation of Auxins.   | 3  |  |
|       | <b>Chapter four:terpenoids and antibiotics</b>  | 10 |  |
|       | <b><i>Terpenoids:</i></b><br>Introduction, Definition, Classification, Nomenclature, Source, importance,            | 2  |  |
|       | Structure , chemistry , structural elucidation of Citral, Menthol and Zingiberene.                                  | 1  |  |
| Six   | Structure , chemistry , structural elucidation of Citral, Menthol and Zingiberene.                                  | 1  |  |
|       | Isoprene and Special Isoprene rule.   | 1  |  |
|       | <b><i>Anti-biotics:</i></b> Introduction, Definition, Classification, Nomenclature, Source, importance,             | 3  |  |
|       | Structure, chemistry, structural elucidation of Penicillin's.   | 2  |  |
|       | Chapter five: <b><i>Natural Pigments:</i></b>   | 5  |  |
| Seven | Introduction, Definition, Classification, Nomenclature, Source and importance                                       | 3  |  |
|       | Structure, chemistry, structural elucidation of Carotene, Lycopene, Bixin , Chlorophyll, Quercetine and Indigotine. | 2  |  |
|       | <b>Chapter six: amino acids, peptides and proteins</b>  | 18 |  |
|       | <b><i>Amino acids :</i></b> Introduction, Definition, Classification Nomenclature, Source and importance            | 3  |  |
|       | Preparation and Properties of amino acids.  | 3  |  |
| Eight | <b><i>Peptides:</i></b> Introduction, Definition, Classification  | 2  |  |
|       | Synthesis and determination of structure of Peptides.   | 4  |  |

|          |  |           |  |
|----------|--|-----------|--|
|          | <b><i>Proteins:</i></b> Introduction, Definition, Classification, properties, structure of Protein, Chemistry of Oxytocin, Thyroxin, Insulin.                | <b>6</b>  |  |
| Nine     | <b>Chapter seven: alkaloids and purines</b>  | <b>18</b> |  |
|          | <b><i>Alkaloids:</i></b> Introduction, Definition, Classification, Nomenclature, Source and importance   | <b>6</b>  |  |
|          | Structure, chemistry, structural elucidation of quinine, morphine and atropine.  | <b>4</b>  |  |
| Ten      | <b><i>Purines:</i></b> Introduction, Definition, Classification, Nomenclature, Source, importance  | <b>4</b>  |  |
|          | Structure, chemistry, structural elucidation of Caffeine.  | <b>4</b>  |  |
|          | <b>Chapter eight: <i>Natural products as markers for new drug discovery, analytical techniques and stereoisomerism</i></b>                                   | <b>26</b> |  |
|          | <b><i>Natural products as markers for new drug discovery</i></b><br>The Role of natural products as potential new drug discovery.                            | <b>2</b>  |  |
| Eleven   | The Role of natural products chemistry in drug discovery.  | <b>3</b>  |  |
|          | Selection and optimization of lead compounds for further development with suitable examples.   | <b>3</b>  |  |
|          | <b><i>Chromatography :</i></b> Introduction, definition,classifications,   | <b>2</b>  |  |
| Twelve   | Introduction, definition, classifications,   | <b>1</b>  |  |
|          | general principles of different chromatographic techniques   | <b>4</b>  |  |
|          | applications of : TLC, HPTLC, Column, Paper, HPLC, GC in the isolation, separation and purification of natural products.                                     | <b>4</b>  |  |
|          | <b><i>Spectroscopy:</i></b> General principles & applications of UV, IR, HNMR, C13 NMR, Mass Spectroscopy in the structural elucidation of natural products. | <b>1</b>  |  |
| Thirteen | General principles & applications of UV, IR, HNMR, C13 NMR, Mass Spectroscopy in the structural elucidation of natural products.                             | <b>3</b>  |  |
|          | <b><i>Stereoisomerism:</i></b> Introduction, Definition, types, concept of Stereoisomerism taking examples of natural products.                              | <b>3</b>  |  |
|          | <b>Final examination</b>   |           |  |

**Delivery mode/methodology:**

- Active learning methods (brain storming, group discussions, etc),
- Lecture
- Group and individual presentation
- Assignment,
- Laboratory practices

**Assessment mechanisms:**

Continuous assessment & summative assessment

- Class attendance (5%)
- Quiz/tests (25%)
- Seminars and Assignments (10%)
- Lab reports and exam (20%)
- Final Exam (40%)

**References:**

1. Natural products chemistry – Nakanishi Golo
2. Natural products – A Laboratory guide by Raphael Ikhan
3. Organic Chemistry by I.L. Finar vol.ii
4. Chemistry of Natural Products by K.W. Bentley
5. Pharmacognosy by Trease and Evans, ELBS.
6. Practical Evaluation of Phytopharmaceuticals by K.r. Brain, T.D. Turner.
7. The Chemistry of Natural Products, Edited by R.H. Thomson, Springer International Edn. 1994.
8. Phytochemical methods of chemical analysis by Harbone.
9. Natural Products from Plants, 1st edition, by Peter B. Kaufman, CRC Press, New York, 1998.
10. Natural products: A lab guide by Raphael Ikan , 2nd Edition, Academic Press 1991.
11. The review of Natural products – Ara Dermarderosia.
12. Modern methods of plant analysis –High performance Liquid chromatography in plant science –H.F.Linskens and J.F.Jacksons.



## **Manufacturing Elective Course Syllabus**

**Course Title:** Pharmaceutical Manufacturing

**Course Code:** Phar4183

**Course ECTS:** 5

**Course Hours:** 135

**Prerequisite:** Pharmaceutical Technology Module

**Co-requisite:** None

### **Course Objective:**

After the completion of this course students will be able to:

- Select appropriate pharmaceutical excipients for a specific dosage form
- Apply principles and techniques of aseptic processing in sterile pharmaceutical manufacturing
- Prepare different sterile and non-sterile preparation at hospital settings
- Understand the regulatory affairs related with product manufacturing and marketing
- Describe some advanced/novel drug delivery systems

### **Course Description:**

This elective course is designed to prepare graduate pharmacists towards the practical aspects of manufacturing of dosage forms with particular emphasis on formulation, processing and regulatory affairs. The course also introduces some advanced/novel drug delivery systems.

### **Course Outline:**

#### 1. Pharmaceutical Excipients (4hrs)

##### 1.1. Definition and goals (why excipients?)

##### 1.2. Type of pharmaceutical excipients

##### 1.2.1. Excipients for solid dosage forms

Desirable characteristics

Diluents, directly compression fillers, granulating agent (binder), disintegrant, lubricant/glidant/antiadherent, coating excipients (polymers, colorants, opaquants, polishing agents)

### 1.3. Excipients for liquid/semisolids dosage forms

#### Desirable characteristics

Solvents/vehicles, cosolvents, solubilizers, preservatives, antioxidants, chelating agents, suspending agents, wetting agents, surfactants, viscosity modifying agents, emulsifying agents, buffers, tonicity agents, sweeteners/ flavors, coloring agents, ointment base, emollients, gelling agents, suppository bases and others

### 1.4. Drug - Excipient Compatibility

## 2. Manufacturing of Sterile Pharmaceuticals (8hrs)

### 2.1. Introduction

### 2.2. Sterile pharmaceutical products: types and formulation aspects

### 2.3. Aseptic Processing

Facility design, GMP requirements and process flow, Clean room: design and qualification standards, HVAC systems, Principles of aseptic processing and media fill, environment and personnel monitoring

### 2.4. Production Activities

Water treatment, Material and component entry, Cleaning and preparation, Compounding, Filling and Stoppering/Crimping/Sealing

### 2.5. Terminal Sterilization/Depyrogenation

Techniques for sterilization (Thermal methods: steam sterilization, dry heat sterilization, Chemical sterilization: gas sterilization, other methods: radiation sterilization, sterilization by filtration)

Techniques for depyrogenation (Acid base hydrolysis, oxidation, alkylation, thermal and ionization radiation depyrogenation)

### 2.6. Quality Control Tests

Particle size and clarity test, pH and osmolality test, sterility test, pyrogen test

## 3. Hospital Manufacturing (6hrs)

### Introduction

### Water treatment

- Sterile and non-sterile preparations (TPN, radiopharmaceuticals,
4. Good Manufacturing Practices and Validation (10hrs)
    - 4.1. Good Manufacturing Practices (4hrs)
      - Basic principles
      - Quality management
      - Sanitation and hygiene, premises, equipment, material, personnel, product, QC, compliant handling and product recall, documentation
      - Heating Ventilation and Air Conditioning (HVAC) system
    - 4.2. Validation and Qualification (6hrs)
      - Introduction, Regulatory basis (principle)
      - Validation and QA, Process validation (Prospective, concurrent and retrospective validation), Cleaning Validation, Sterilization validation, Analytical method validation, Revalidation,
      - Facility and equipment qualification (DQ, IQ, OQ and PQ), Change control
  5. Regulatory Affairs (12hrs)
    - General Guidance and Principle
    - 5.1. Pharmaceutical plant inspection
      - Inspection for premises licensing, Inspection for GMP certification, Inspection of API plants
    - 5.2. Registration/Marketing authorization of medicines
      - General
      - Administrative and Product Information (Application form, agency agreement etc), Dossier Overall Summary (DOS), Quality (Drug substance and drug product), Non-Clinical Study Reports (Pharmacology, Pharmacokinetics and Toxicology), Clinical Study Reports (Reports of biopharmaceutic study, BA, Comparative BA and BE, *In vitro-In vivo* Correlation, human pharmacokinetic study, human pharmacodynamic study, report of efficacy and safety studies, study of controlled clinical study)
    - 5.3. Quality Control Testing
    - 5.4. Inspection and Post Marketing Surveillance
    - 5.5. Bioequivalence and Product Interchangeability
      - Principles of interchangeability testing, Design of BE studies, Selection of comparators

Basic statistical and analytical considerations, Regulatory requirements for bioequivalence and existing guidelines, Presentation of BE data in product dossier, BE study assessment - practical issues

6. Advanced Pharmaceutical Dosage Forms  
Microencapsulation

Liposomes and micelles, nanoparticles, hydrogel based drug delivery, Introduction to novel drug delivery systems: overview, classifications and structure, physicochemical properties and applications

**Mode of Delivery**

- Lecture: 48hrs
- Field visit: 15hrs
- Home Study: 42hrs
- Project Work: 20hrs
- Presentation: 10hrs

**Mode of Assessment**

- Tests/quizzes: 35%
- Assignments (Group and/or individual): 10%
- Presentation: 15%
- Final exam: 40%

**References**

1. The Theory and Practice of Industrial Pharmacy, L. Lachman, H. A. Lieberman, and J. L. Kanig, 3<sup>rd</sup> Edition, Lea and Febiger, Philadelphia, 1986.
2. Handbook of Pharmaceutical Excipients, The American Pharmaceutical Association and the Pharmaceutical Society of Great Britain, Washington DC and London, 1986.
3. The Science of Dosage Form Design, M. E. Aulton, 2<sup>nd</sup> Edition, Churchill Livingstone, UK, 2002.
4. Pharmaceutical Manufacturing Handbook: Production and Processes, S. C. Gad, John Wiley & Sons, Inc., Hoboken, New Jersey, 2008.
5. Pharmaceutical Manufacturing Handbook: Regulations and Quality, S. C. Gad, John Wiley & Sons, Inc., Hoboken, New Jersey, 2008.
6. Excipient Development for Pharmaceutical, Biotechnology, and Drug Delivery Systems, A. Katdare, and M. V. Chaubal, Informa Healthcare USA, Inc, New York, 2006.
7. WHO Guidelines: GMP

**Module name: Professional electives**

**Module Number in which the course exists: 18**

**Course title: Pharmacogenetics**

**Course code: Phar 4184**

**Course EtCTS: 5**

**EtCTS credits:** 5 (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lectures =48 hours
- Assignment (group and individual) =10 hours
- Library reading =15 hours
- Home based study=22 hours
- Group discussion and presentation=14 hours
- Tutorial=16 hours

Pre-requisite if any: Pharmacology I and II

### **Course description**

Pharmacogenetics is aimed at advancing our knowledge of the genetic basis for variable drug response. One of the great challenges in drug development and therapy is maximizing therapeutic response while avoiding adverse effects. The ultimate goal of offering this course is to enable the trainees to understand and identify clinically significant variations to predict the right choice and dose of medications for individuals-- “personalizing medicine” especially in the case of anticancer or antiviral agents where the therapeutic index is very narrow and a large proportion of patients do not respond. The course also helps the students to know the fact that response and toxicity are multigenic traits and are often confounded by nongenetic factors (e.g., age, co-morbidities, drug-drug interactions, environment, diet, etc). As pharmacogenomic advances allow for individualized drug therapies based on genotypic information, the cost of and morbidity from drug toxicity is expected to decrease, and drug efficacy is expected to increase. The ethics and economics of Pharmacogenetics will also be discussed.

### **Course objectives**

**Upon completion of this course, the student will be able to:-**

- describe the study and scope of Pharmacogenetics

- identify how genetic factors contribute to the response of drug therapies
- identify how genetic factors contribute to the toxicities of drug therapies
- describe the non genetic factors which may confound the drug response and toxicity
- describe the potential clinical work of individualized drug therapies based on genotypic information
- describe the ethical issues related to Pharmacogenetics
- describe the economic significance of Pharmacogenetics

### Course Schedule

| Day    | Chapter/Topic   | Allotted time | Reference |          |
|--------|---|---------------|-----------|----------|
| 1      | <b>1. Pharmacogenetics Basics</b>   |               |           |          |
|        | ➤ Pharmacogenetics: A Historical Perspective                                  | 2             |           |          |
|        | ➤ Applications of Genomics in Human Health and Complex Disease                | 4             |           |          |
|        | ➤ Pharmacogenetics of Oxidative Drug Metabolism and Its Clinical Applications | 4             |           |          |
| 2      | <b>(cont)</b>   |               |           |          |
|        | ➤ Pharmacogenetics of Oxidative Drug Metabolism and Its Clinical Applications | 2             |           |          |
|        | ➤ Phase II Drug-Metabolizing Enzymes  | 6             |           |          |
|        | ➤ Drug Transporter Pharmacogenetics   | 2             |           |          |
| 3      | <b>(cont)</b>   |               |           |          |
|        | ➤ Drug Transporter Pharmacogenetics   | 2             |           |          |
|        | ➤ Drug Target Pharmacogenetics  | 5             |           |          |
|        | ➤ Pharmacogenetics in Drug Discovery and Drug Development                     | 3             |           |          |
| Test 1 |   |               |           |          |
| 4      | <b>Chap 1(cont)</b>   |               |           | 1, 2 & 5 |
|        | ➤ Pharmacogenetics in Drug Discovery and Drug Development                     | 2             |           |          |
|        | <b>2. Pharmacogenetics applications in treating diseases</b>                  |               |           |          |
|        | ➤ Pharmacogenetics of Solid Tumors  | 8             |           |          |
| 5      | ➤ Pharmacogenetics of Hematologic Malignancies                                | 7             |           |          |

|        |   |    |  |
|--------|---|----|--|
|        | ➤ Warfarin Pharmacogenetics   | 3  |  |
| 6      | ➤ Infectious Diseases   | 10 |  |
| 7      | ➤ Cardiovascular Diseases   | 8  |  |
|        | ➤ Psychiatry  | 2  |  |
| 8      | <b>(cont)</b><br>➤ Psychiatry                                       | 5  |  |
|        | ➤ Respiratory Diseases  | 6  |  |
| 9      | ➤ Transplantation   | 5  |  |
|        | Seminar presentation  |    |  |
|        | <b>3. Ethical, Legal, Social, And Regulatory Issues</b>             |    |  |
|        | ➤ Ethical, Legal, and Social Challenges to Applied Pharmacogenetics | 5  |  |
| 10     | ➤ Cost-effectiveness, Economic Incentives, and Reimbursement Issues | 5  |  |
|        | ➤ Ethical and Privacy Issues in Pharmacogenomic Research            | 5  |  |
| Test 2 |   |    |  |
| 11     | <b>4. Fundamentals Of Applied Human Genomics</b>                    |    |  |
|        | ➤ Principles of Genetic Medicine                                    | 3  |  |
|        | ➤ Applied Molecular and Cellular Biology                            | 4  |  |
|        | ➤ Analysis of the Human Genome and Proteome                         | 3  |  |
| 12     | <b>(cont)</b><br>➤ Analysis of the Human Genome and Proteome        | 5  |  |
|        | ➤ Bioinformatics  | 5  |  |
| 13     | <b>(cont)</b><br>➤ Bioinformatics                                   | 5  |  |
| 14     | Final exam  |    |  |

**General Teaching Learning Methods for the course:**

- Active learning methods (brain storming, buzz group, discussion, etc),
- Lecture
- Presentation
- Assignment
- Individual learning (reading assignment)

**General Assessments/Evaluation methods for the course:**

Continuous assessment & summative assessment

- Quiz (15%)
- Test (20%)
- Presentation (10%)
- Assignment (15%)
- Final Exam (40%)

**References**

1. [Pharmacogenomics in Clinical Therapeutics](#) publisher: Wiley-Blackwell, published: 2012-03-13
2. [Concepts in Pharmacogenomics \(Zdanowicz, Concepts in Pharmacogenomics\)](#) by: Martin M. Zdanowicz Ph.D. M.A. publisher: American Society of Health-System Pharmacists, published: 2010-01-01
3. [Principles of the Human Genome and Pharmacogenomics](#) by: Daniel A., Ph.D. Brazeau publisher: Amer Pharmaceutical Assn, published: 2011-01-30
4. pharmacogenomics by: Ma-Li Wong ZHU BIAN Julio Licinio publisher: Science Press, published: 1991
5. Pharmacogenomics by: ZHU BIAN JIANG YUAN YING publisher: People s Medical Publishing House, published: 1991
6. Pharmacogenomics and Personalized Medicine (Methods in Pharmacology and Toxicology) publisher: Humana Press, published: 2010-11-09



**Module name: Professional electives**

**Module Number in which the course exists: 18**

**Course title: Pharmaceutical Quality Control and Quality Assurance**

**Course code: Phar 4185**

**Course EtCTS: 5**

**EtCTS credits:** 5 (This course needs a total of  $5 \times 27 = 135$  working hours to spend in each teaching and learning as well as assessment activities). The distribution of these hours will be as follows

- Lectures =48 hours
- Assignment (group and individual) =10 hours
- Practical/laboratory sessions: 16hrs
- Home based study=31 hours
- Group discussion and presentation=10 hours
- Tutorial=10 hours

Pre-requisite if any: Pharmaceutical Analysis I & II

**Course description:**

The course deals with different quality aspects of pharmaceutical products starting from their production to consumption by the customers. The course mainly covers areas of GMP and different quality control measures taken after the drug is released to market.

**Course objectives:**

At the end of the course, the student will be able to:

- ✓ Describe the concepts and philosophies of TQM AND GMP
- ✓ Explain the different manufactures and controls taken on dosage forms
- ✓ Describe good laboratory practice and standard operating procedures
- ✓ Describe the major concepts of packaging and labeling of pharmaceuticals

**Schedule of chapters/topics/subtopics, allotted time and reference materials for each topic**

| Day   | Chapters and topics/subtopics   | Time allotted (hrs) | References |
|-------|---|---------------------|------------|
| One   | <b>Chapter one:</b><br>Concepts and Philosophy of TQM, GMP (orange guide) and ISO-9000  | 10                  |            |
| Two   | <b>Chapter two:</b><br>Organization and personnel responsibilities, training, hygiene   | 7                   |            |
|       | <b>Chapter three: Premises</b>  | 7                   |            |
|       | Location, Design, Plan Layout, Construction, Maintenance and Sanitations.   | 3                   |            |
| Three | Environmental control, Sterile areas, control of contamination  | 4                   |            |
|       | <b>Chapter four: Equipments :</b>   | 7                   |            |
|       | Selection, purchase specifications, maintenance, sterilization of an area (TP & STP)  | 6                   |            |
| Four  | Selection, purchase specifications, maintenance, sterilization of an area (TP & STP)  | 1                   |            |
|       | <b>Chapter five: Raw Materials :</b>  | 7                   |            |
|       | Purchase specifications, Maintenance of stores, Selection of vendors, Controls on Rawmaterials  | 7                   |            |
|       | <b>Chapter six: Manufacture and controls on dosage forms</b>  | 10                  |            |
|       | Manufacturing Documents, Master Formula, Batch Formula  | 2                   |            |
| Five  | Records, Standard operating procedure, Quality audits of manufacturing processes and facilities   | 8                   |            |
|       | <b>Chapter seven:</b>   | 7                   |            |
|       | Standard operating procedures for various operations like cleaning, filling, drying, compression, coating, disinfection, sterilisation, membrane filtration | 2                   |            |
| Six   | Standard operating procedures for various operations like cleaning, filling, drying, compression, coating, disinfection, sterilisation, membrane filtration | 5                   |            |
|       | <b>Chapter eight: Packaging and labeling controls</b>   | 18                  |            |
|       | Line clearance, reconciliation of labels; cartons and other packaging material; types and tests assuring quality of glass.                                  | 5                   |            |
| Seven | Types of plastics used, permeation, leaching, sorption, chemical reactions, biological tests, modification of plastics by drugs;                            | 5                   |            |

|          |  |        |  |
|----------|--|--------|--|
|          | Different types of closures and closure liners; film wrapper; Blisterpacks, Bubble packs, shrink handling; foil / plastic pouches, bottle seals, tape seals, breakable seals and sealed tubes; | 5      |  |
| Eight    | Quality control of packaging material and filling equipment  | 3      |  |
|          | <b>Chapter nine: Quality control Laboratory :</b>  | 13     |  |
|          | Responsibilities, Good Laboratory Practices, Routine controls, Instruments, Protocols, Non-clinical testing  | 7      |  |
| Nine     | Controls on animal house, Application of Computers in Quality control laboratory.  | 6      |  |
|          | <b>Chapter ten:</b> Finished product release :   | 7      |  |
|          | Quality review, Quality audits, Batch release document   | 4      |  |
| Ten      | Quality review, Quality audits, Batch release document   | 3      |  |
|          | <b>Chapter eleven:</b> Warehousing :   | 5      |  |
|          | Good warehousing practice, Materials, Managements.   | 5      |  |
|          | <b>Chapter twelve:</b><br>Waste disposal, Scrap disposal procedure and records.  | 5<br>2 |  |
|          | Waste disposal, Scrap disposal procedure and records.  | 3      |  |
| Eleven   | <b>Chapter thirteen:</b>   | 7      |  |
|          | Regulatory aspects of Pharmaceuticals and Bulk drug Manufacturing  | 7      |  |
|          | Regulatory drug analysis   |        |  |
| Twelve   | <b>Chapter fourteen:</b> WHO Certification, Globalisation of Drug Industry, Introduction to Export of Drugs and Import Policy  | 7      |  |
| Thirteen | <b>Final examination</b>   |        |  |

#### **Delivery mode/methodology:**

- ✓ Active learning methods (brain storming, group discussions, etc),
- ✓ Lecture,
- ✓ group and individual presentation,
- ✓ assignment
- ✓ Laboratory practice

**Assessment mechanisms:**

Continuous assessment & summative assessment

- Quiz (10%)
- Tests (10%)
- Assignments (15%)
- Presentation (10%)
- Lab reports and exam (20%)
- Final Exam (35%)

**References:**

1. Quality Assurance Guide by Organisation of Pharmaceutical products of Ethiopia.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg, Vo. 69, Decker Series
3. Quality Assurance of Pharmaceuticals – A compendium of guidelines and related materials – Vol. I – WHO Publications
4. A guide to Total Quality Management – Kaushik Maitra and Sedhan K. Ghosh.
5. How to practice GMPs – P. P. Sharma
6. ISO 9000 and Total Quality Management – Sadhan K. Ghosh.
7. The International Pharmacopoeia Vol. 1,2,3,4 - 3rd Edition, General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms

## **Module 19: Pharmacy clerkship module**

**Module name:** Pharmacy clerkship module

**Module category:** Core

**Module code:** Phar-M5191

**Module Number:** 19

**Module weight in EtCTS:** 43

**Courses:** Ambulatory care clerkship (Phar5191) (7 EtCTS)

Pediatric clerkship (Phar5195) (7 EtCTS)

Psychiatry clerkship (Phar5197) (3 EtCTS)

Hospital pharmacy clerkship (Phar5194) (5 EtCTS)

Internal medicine clerkship (Phar5193) (7 EtCTS)

Community pharmacy clerkship (Phar5199) (5 EtCTS)

Drug information service clerkship (Phar5192) (3 EtCTS)

Surgery clerkship (Phar5198) (3 EtCTS)

Gynecology, obstetrics & family planning clerkship (phar5196) (3 EtCTS)

### **Module description:**

This year based clerkship module provides students with a structured, supervised program of participation in the practice of clinical pharmacy. Students gain experience in problem solving and providing patient care services while applying the basic and applied pharmaceutical sciences learned in the didactic courses & practical laboratories. This module should also provide the means by which the students will extend their clinical knowledge and skills. It emphasizes problem solving in the everyday milieu of patient care with in a setting of integrated interdisciplinary patient care. This module has a total of 43 EtCTS to be conducted in one year.

**Module objective:** At the end of this module students will be able to:

- Processing prescriptions/medication orders
- Identifying and resolving drug related problems through patient information retrieval and assessment
- Development of patient specific Pharmacotherapy care plans
- Monitor drug therapy
- Communicate with patients and other health care providers
- Provide patient education and training
- Demonstrate drug and literature information retrieval, evaluation, application, and related verbal and written communication skills
- Develop a practical and functional understanding of pharmacy services/systems in different practice settings, to include related patient safety and management responsibilities
- Describe the traditional and innovative roles of pharmacy practitioners in a variety of practice settings

- Apply and further evolve knowledge and skills in practice environments.
- Formulate career direction and strategy, in conjunction with the efforts of the student's academic advisor and preceptors.

**Module competency:**

- Provide Pharmaceutical Care and ensure the optimal use of medicines by the patient;
- Provide pharmacist-initiated care to patients and ensure the optimal use of medicines;
- Provide training and information on health care and medicines;
- Promote community health and provide related information and advice; and
- Conduct research to ensure the optimal use of medicines.
- Be able to work with members of the health team.
- Maintain pharmacy ethical code of conduct
- Demonstrate respect and compassion to patients, to their relatives and other professions

**Mode of delivery:** year based

**Mode of Assessment:**

Daily activity at rotation site

Clinical pharmacy related presentation: patient case presentation, seminar

Portfolio preparation & submission

Journal club presentation

Internal and external oral exam

Written exam

**Module learning teaching methods**

Case presentation/morning session, patient chart review, ward rounds, journal club & seminar, and project work, bedside teaching

## **Pharmacy Clerkship Module Courses Syllabi**

### **Clerkship Title: Ambulatory Care Pharmacy Practice Clerkship Rotation Syllabus**

**Clerkship Code: Phar5191**

**Clerkship EtCTS: 7**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: None**

#### **Clerkship Description:**

- Offered in a variety of ambulatory care settings to include outpatient specialist clinics including HIV/AIDS clinic, TB clinic, chronic illness clinic (e.g. cardiac, Hypertension, Diabetic and epilepsy clinic) and Chest Clinic, this experience emphasizes primary care using a case management approach with an out-patient population, to include: patient data collection, organization, and assessment; development of care plans that correspond to desired therapeutic objectives; patient monitoring, to include physical and laboratory assessment; communication with patients (and care givers) to acquire patient data, assess target outcomes and provide education and communication with prescribers, and other health care providers to optimize outcomes. Provision of preventive health education and screening services is expected in most settings.

**Clerkship Objectives:** The student's learning goal for this clerkship is to develop the essential skills necessary to provide patient- specific care to patients in the ambulatory care

- Evaluate pathophysiology, clinical presentation, treatment goals, drug therapy, monitoring parameters, outcome measures, prognosis, and long-term management of common medical conditions in the ambulatory care setting.
- Identify drug-related problems; formulate and implement patient-specific, evidence-based patient care plans, and follow up to determine patient progress.
- Succinctly and clearly present oral and written outlines of patient work-ups.
- Synthesize succinct, evidence-based answers to drug information questions posed by patients or health care colleagues.
- Evaluate patient understanding of provided information about medical conditions, drug therapy, outcome goals, potential side effects (and what to do if side effects occur), and other medication-related information.

- Demonstrate professional conduct and demeanor that is ethical and responsible displaying integrity, compassion, empathy, and respect.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending ambulatory care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at Ambulatory Clinics.....50%
- Portfolio preparation and submission.....25%
- Clinical pharmacy Related Presentation – formal case presentation , Journal Club presentation, seminar.....10%
- Oral/ viva/ & Written Examination .....15%

**Task List for Ambulatory Care Pharmacy Practice Rotations**

A list of specific tasks has been established for each of the core rotations to serve as a guide to the minimum requirements necessary to demonstrate competency. Reasonable effort should be made to accomplish these tasks when possible.

- For all assigned patients, review the patient’s medical record and when possible conduct an interview. Evaluate current medication regimens and monitoring history. Be prepared to make therapeutic & monitoring recommendations. Be prepared to recommend & assess all new medication prescriptions.
- On selected patients, complete a detailed medication history. Assess achievement of treatment outcomes, ADRs, compliance etc. Make recommendations regarding drug therapy assessment and justify any proposed changes or interventions to preceptor or primary care provider.
- Assess and optimize doses for all applicable medications regarding renal function, pharmacokinetic evaluation of serum concentrations (if available) and other quantitative monitoring parameters (e.g. INR, blood glucose, etc): make dose or drug selection recommendations based on assessments.



- Prepare and present patients to preceptor (Pharmacotherapy Rounds): List patient problems, drug therapy, monitoring parameters, therapeutic end-points, dosage, potential ADRs and interactions. Discuss appropriateness of current and alternate medication therapies.
- Drug information: provide concise, up to date and evidence based drug information responses. Submit at least 4 written drug information responses given
- Submit 4 adverse drug events and 8 medication errors identified during the rotation
- Submit 2 Pharmaceutical care services given during the rotation using 2 page SOAP format

**Clerkship Title: Community Pharmacy Practice Clerkship**

**Clerkship Code: Phar5199**

**Clerkship EtCTS: 5**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: none**

**Clerkship Description:**

- Taking place in community pharmacy services, this experience emphasizes a wide range of exposures, to include: prescription dispensing and OTC selection; patient communication and education; communication with prescribers and other health care providers; and pertinent management activities.
- This community pharmacy practice clerkship provides students with experience in providing Medication Therapy Management to patients in an outpatient pharmacy setting. The student's learning goal for this experience is to develop the essential skills necessary to provide patient- specific care in the community pharmacy setting.

## **Clerkship Goals:**

- Provide medication therapy management; review profile and perform medication history to create a personal medication record; and design medication action plan for a patient.
- Communicate and collaborate verbally and in writing with patients, caregivers, health care providers, and others to improve patient care.
- Assess patients and recommend over-the-counter medication, non-drug therapy, medical goods, and complementary therapies beneficial for patient care.
- Triage patients to appropriate health care providers and social service agencies.
- Provide public health and wellness services and educational materials tailored to the needs of patients and caregivers in the community practice setting.
- Demonstrate professional conduct and demeanor that is ethical and responsible displaying integrity, compassion, empathy, and respect.

## **Clerkship Objectives**

Upon successful completion of the experiential in community pharmacy, the student will be able to:

- **Process a prescription order**
  - Receive and evaluate the original prescription or refill
  - Review for accuracy, completeness, validity, and appropriateness
  - Differentiate between the prescription drop-off interview and the dispensing/exit interview
  - Prepare prescription for dispensing
  - Evaluate and monitor prescription refills
  - Determine therapeutic indications
  - Help select correct medication and appropriate dosage forms
  - Discuss the appropriateness of dosage, frequency, and route of administration with patients and other health care providers
- **Retrieve and interpret patient specific data**
  - Retrieve information from the prescription and/or patient, if possible patient medical record

- Construct and maintain accurate patient profiles
- Construct and maintain patient problem lists
- Interpret patient data in regards to specific disease states and patient complaints.

### **Identify patient specific drug related problems**

- Identify drug related problems through drug regimen reviews, clinical assessment of a patient, reviewing the patient profile and through patient consultations.
- Utilize available technology and patient interviewing techniques to:
  - identify drug-drug/drug-disease/drug-nutritional and drug-allergy interactions
    - ii. Identify appropriate drug therapy
    - iii. Assess patient compliance
    - i
    - v. Assess patient understanding of their disease states and current medications
- **Demonstrate knowledge of country pharmacy laws and regulations**
  - Utilize professional and ethical judgment in the interpretation of laws and regulations of FMHACA
  - Assure the medication order conforms to the federal regulations/FMHCACA regulations, including Laws/policies regarding controlled substances and generic/therapeutic substitution
- **Demonstrate knowledge of management skills needed to maintain a pharmacy department**
  - Utilize various methods of purchasing and demonstrate knowledge as to the advantages and disadvantages of each method
  - List technologies that can be used in pharmacy operations
  - Utilize interpersonal skills in working with health care providers and pharmacy staff
  - Determine methods to improve a pharmacy operating
- **Assess and evaluate the financial impact of drug therapy**
  - Evaluate drug therapy costs, including costs of drugs as well as monitoring costs

- Evaluate financial consideration of alternative therapies
- **Provide patient counseling and disease state education**

Effectively conduct a patient interview

Review medication information with the patient to insure appropriate use and compliance of drug therapy

Utilize patient education materials to assist patients in understanding their roles in effective medication use

Counsel patients with respect to assessment of adverse effects of their medications and how to care for these effects

Counsel patients with respect to non-prescription medications

Counsel patients with respect to common community-related disease states

Counsel and train patients on the appropriate use of disease state monitoring tools (blood-pressure cuffs, blood glucose monitors, peak-flow monitors, etc.)

Document patient interventions and patient care appropriately

- **Conduct patient evaluations**

- Recognize the need for pharmacist interventions
- Refer patients to appropriate medical personnel when necessary

- **Provide drug information**

- Effectively retrieve and evaluate medical information for patients and health care providers
- Describe the pharmacist's role in providing health care information within the community
- Demonstrate effective communication skills, written and verbal, to preceptors, patients, physicians, and other health professionals

- Obtain necessary background information to accurately answer drug information questions.
- Effectively evaluate, interpret, and summarize pharmaceutical and medical literature
- Identify and utilize, both efficiently and effectively, appropriate drug information sources
- **Demonstrate professional attitude and conduct**
  - Exhibit neatness and professionalism in appearance and work
  - Accept constructive criticism, demonstrate receptiveness to feedback
  - Demonstrate dependability, punctuality, courteousness, and tactfulness when dealing with patients and members of the health care team
  - Maintain professional and ethical standards- compliance with laws and regulations, good professional judgment, reliability, and credibility when dealing with colleagues, patients, and other health care professionals
  - Display self-directed (independent) learning, conduct self-assessment, develop a personal learning plan, and pursue knowledge independently
  - Demonstrate competency in organizing and planning, establish management skills, set meaningful and attainable goals and be consistently well prepared
  - Maintain confidentiality
  - Display a patient and empathetic attitude towards patients including appropriately body language showing genuine interest in the well-being of the patient
  - Respond to assignments in a timely manner and is consistently on time and ready for work upon arrival, with no unexcused absences.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending Community Pharmacy establishments, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Task List for Community Rotations**

A list of specific tasks has been established for each of the required rotations to serve as a guide to the minimum requirements necessary to demonstrate competency. Provided below are samples of a few of the tasks defined for each specific core experiential rotation. Reasonable effort should be made to accomplish these tasks when possible.)

- Process Prescriptions (> 60) of various types.
- Evaluate patient medication profiles. Discuss and document the resolution of 6 patient-profile (Clinical) of Drug related problems.
- Provide a minimum of two written patient assessments and pharmaceutical care plans (MTM services) of assigned patients.
- Develop/Discuss/Document resolution of 8 patient- specific financial problems in purchasing medications for chronic diseases
- Discuss the handling of the following scenarios with preceptor: suspected RX forged, discovery of an error, prescriber consensus challenges, notifying a patient that a medication error has occurred, and dealing with difficult patient / MD.

- Counsel patients on the use of medications (> 20 pts) including: insulin, statins, opiates (acute/chronic), inhalers, warfarin, pediatric dose measuring/administration, or others selected by preceptor. The student should report calculations done in the rotation. Students will be required to complete and document three counseling sessions and associated follow-up/interventions.

**Clerkship Title: Drug Information Service Clerkship**

**Clerkship Code: Phar5199**

**Clerkship EtCTS: 5**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: none**

**Clerkship Description:**

- The Drug information service clerkship will be offered at Drug Information Centre and this experience emphasizes the use of drug literatures in the promotion of safe, effective and rational drug therapy. This clerkship provides students to develop the skills for retrieving, evaluating and communicating drug information to health care professionals and the patient.

**Clerkship Objectives:** At the end of the rotation in the Drug Information Centre students should be able to:

- Develop the capability to comfortably and confidently provide drug information to individuals and groups
- Demonstrate the ability to research drug information independently using multiple sources in a timely manner
- Develop a logical, step-wise approach to searching the drug information resources
- Develop critical decision-making skills relative to the selection, retrieval, and evaluation of appropriate literature resources

**Mode of delivery:** Journal Club/ Case presentation/morning session, Patient Chart review, attending drug information center, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Activities to be performed by students during the rotation**

- Receive drug information queries and fill each question on the Drug Information Centre (DIC) request form
- Provide concise, applicable, comprehensive, and timely responses to requests for drug information from patients, health care providers, and the public
  - Perform literature searches on Medline, International Pharmaceutical Abstracts, PubMed, Micromedex and related Databases
  - Identify potential evidence based solutions/answers to queries from literature;
  - Obtain Approval from the preceptor before communicating the requested information
  - Communicate the information professionally
  - Clearly express and justify their recommendation(s) in both written and oral forms
- Accurately document the drug information request
- There shall be a case presentation and discussion session twice per week in the afternoon. The students will present a journal club on selected article in the area of drug information.
- The student is expected to submit handouts for the journal club and a portfolio for filled drug information response provided during the clerkship.



**Clerkship Title: Hospital Pharmacy Practice Clerkship**

**Clerkship Code: Phar5194**

**Clerkship EtCTS: 5**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: none**

**Clerkship Description:**

- Taking place in hospital-based pharmacy services, this experience emphasizes administrative and pharmacy service functions, to include: drug distribution and dispensing; D.U.E. [if any undergoing]; A.D.R. and Medication error reporting, formulary review and amendment [if any,]; cost containment outcome assessment; quality care assurance; inventory control; and maintenance of mandated hospital pharmacy records.
- The student Pharmacists are expected to provide hospital pharmacy Clerkship with integration to clinical pharmacy services in the above delivery sites.

### **Rotation task list/activities for Hospital Pharmacy Rotations**

A list of specific tasks has been established for each of the required clerkships to serve as a guide to the minimum requirements necessary to demonstrate competency. Provided below are samples of a few of the tasks defined for each specific core clerkships [drug distribution system, dispensing...]. Reasonable effort should be made to accomplish these tasks when possible).

The student will spend two weeks in a hospital pharmacy department. The student will experience pharmacy operations and services relating to systems for medication distribution, medication use and drug control, management of the department, scope of clinical services provided by the department, and department relationships within the institution and health systems.

- As frequently as possible, if any of the following present at time of attachment otherwise we expect the preceptor to brief each of the students on the following issues, attend clinical/operational meetings: Pharmacy and Therapeutics Committee (PTC), PTC

subcommittees, Patient Safety, Pharmacy Staff, Nursing/Pharmacy and others as identified by preceptor.

- As frequently as possible, attend educational meetings: staff in-services, Grand Rounds, and others as identified by preceptor.
- Participate in basic administrative activities needed to maintain a hospital pharmacy department
- Involve in purchasing, inventory control, and basic fiscal procedures
- Participate in drug security, storage, and control procedures and quality assurance works
- Apply licensing, regulatory, and accreditation standards which are necessary for the operation of a hospital pharmacy
- Describe the policies and procedures for maintaining quality assurance using JCAHO and ASHP standards [ these are international benchmarks for hospital pharmacy services]
- Participate in the intradepartmental and interdepartmental continuous quality improvement process and importance of project teams, if any
- Read about the role of technology and alternative distribution systems as they relate to expanded clinical services
- Assess and evaluate the financial impact of drug therapy
- Evaluate drug therapy costs, including costs of drugs as well as monitoring costs
- Evaluate financial consideration of alternative therapies
- Design the various means the pharmacy department seeks reimbursement for its distributive and cognitive services. The student should discuss the impact of pharmaceutical care programs on the health of patients and how they impact the cost of care
- Students should be given reading assignment on the following issues – effective utilization of automation / informatics - an assigned activity that provides insight into the benefits & challenges of automation / informatics (e.g. CPOE, decision support, distribution, compounding, drug information retrieval, etc.

- Participate in the drug dispensing process related to providing meds for new orders and ongoing supply (unit dose etc.) in order to understand system flow and verification that meds dispensed are correctly prepared.
- Under the supervision of a pharmacist, process a broad variety of new medication orders. Processes to include: medication order assessment, order entry or order verification, evaluation and application of computer alerts, resolution of problems and over-sight of medication dispensing. Closely observe and simulate those processes from printed profile and demonstrate an understanding of workflow.
- [students should be given reading assignment on these areas since we don't have currently such system]- how to prepare a number and variety of sterile parenteral products sufficient to demonstrate acceptable competency. Syringe, small and large volume, etc. Participate in TPN and chemotherapy processing and preparation if feasible. Discuss both patient and environmental safety issues.
- Develop/discuss/document resolution of 5 patient profile reviews or new medication order problems.
- Prepare at least **20** medication orders for the patient by evaluating the medication order and selecting the proper product.
- Identify drug-related problems (minimum of 5) and document in the work book or portfolio.
- Package and dispense multiple dosage forms including IV admixtures as assigned by the preceptor.
- Communicate therapeutic recommendations to other health care professionals.
- Perform at least **15** pharmaceutical calculations related to the medication order, including pediatric orders.
- Develop concise, applicable, comprehensive, and timely responses to requests for drug information from other health care providers in the hospital setting.
- Participate in the health system's formulary process/drug monograph, if any

- Perform prospective and retrospective financial and clinical outcomes analyses to support formulary recommendations and therapeutic guideline development
- Understand the relationship between medication distribution and clinical pharmacy services, and identify barriers between the two components.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending hospital Pharmacy, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Clerkship Title: Internal Medicine Pharmacy Practice Clerkship Rotation Syllabus**

**Clerkship Code: Phar5193**

**Clerkship EtCTS: 7**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: None**

**Clerkship Description:**

- Taking place on adult internal medicine services located in acute care sites including Medical Intensive Care Unit, this experience emphasizes primary patient care using a case-management approach, to include: patient data collection, organization, and assessment; development of plans that respond to desired therapeutic plans; patient monitoring to include physical and laboratory assessment; communication with patients (and care givers) to acquire patient data, asses target outcomes, and provide education;

communication with prescribers, and other health care providers, to seek clarification and provide observations and recommendations consistent with the care plan; and provision of drug information to health care professionals in the hospital.

### **Clerkship Objectives**

Upon successful completion of the experiential in Internal Medicine inpatient care, the student will be able to:

- Demonstrate an understanding of the pharmacotherapy of the most common acute and chronic disease states encountered in the institutional setting
- Discuss disease management including pathophysiology and drug therapy as it relates to patient specific characteristics and disease states
- Review the mechanism of action, indications, contraindications, adverse effects, and drug-interactions for each of the patient's medications
- Identify laboratory tests necessary to diagnose and monitor various disease states, describing the usefulness and limitations of each test
- Describe how certain disease states affect laboratory values and how they alter the interpretation of these laboratory values
- Assess findings to determine real and potential pharmacotherapeutic problems, ranks them in order of acuity; describes probable causes/effects, and gathers additional information to define/clarify the problems
- Demonstrate ability to perform discharge/follow-up medication teaching and/or instruct patients in medication education classes
- II. Retrieve and interpret patient chart information
- Obtain a complete medical and surgical history (including family history)
- Obtain allergy status of the patient including drug, food, other (E.g. dye, latex) and types of reactions
- Obtain a complete medication history including prescribed medications, over-the-counters, and complementary medications (herbals, supplements, etc.). Include dose, route of administration, and frequency of use. Document in the appropriate manner

- Obtain information regarding whether or not the patient administers his/her own medication(s) or if a caregiver shares this responsibility, and if compliance aids are utilized, needed or appropriate; document and report noncompliance issues to preceptor
- Obtain information regarding behavioral issues such as tobacco, alcohol, and illicit drug use, diet, and exercise
- Obtain information regarding the patient's use of services outside of the primary care setting, including mental health, chiropractic, acupuncture, etc.
- Obtain information regarding the patient's financial situation (e.g. prescription costs, insurance, eligibility for indigent care)
- Obtain most recent information from medical record including laboratory data, vital signs, physician's orders, and consult notes
- Identify drug-related problems from patient chart and document evidence of the problem
- Recognize the need for pharmacist intervention
- III. Design a Pharmaceutical Care Plan
- Retrieve and interpret patient chart information
- Construct and maintain patient problem list
- Assess each problem on patient's problem list appropriately (i.e. need for therapy, current therapy, potential therapy)
- Apply the knowledge in pathophysiology and drug therapy to patient care situations
- Formulate recommendation plan for each problem on patient's problem list (i.e. recommended pharmacological and non-pharmacological therapy, drugs to be avoided, further tests, follow-up)
- Provide rational drug therapy recommendations based on information obtained from the patient interview, physical assessment/examination, laboratory data, medical record, etc.
- Design medication regimens that are convenient, affordable, and will produce optimal patient outcomes (e.g. side effect profile, dosage form, etc.)
- Perform prospective drug regimen reviews to evaluate contraindications and drug-drug and food-drug interactions utilizing knowledge of medicinal chemistry, biochemistry, pharmacokinetics, herbal/nutritional supplements/over-the-counter medicines

- Evaluate the primary literature and national treatment guidelines and its utility in meeting patient needs (including case reports, if appropriate) to make a reasonable decision based on available information
- Identify goals of therapy, including effects on quality of life (QOL)
- List and obtain monitoring parameters (i.e. toxic, therapeutic)
- Write clear and concise consultation notes or progress notes (e.g. SOAP notes)
- Communicate to patient, physician, and preceptor therapeutic plan both verbally and written as needed
- Complete and update the patient medication record and other pharmacy notes/documentation systems as needed
- Modify recommendations as needed
- IV. Provide drug information
- Describe the pharmacist's role in providing health care information within the Internal medicine setting
- Obtain necessary background information to accurately answer drug information questions
- Identify and utilize, both efficiently and effectively, appropriate drug information sources (including local Poison Information Center)
- Effectively retrieve and evaluate medical information for patients and health care providers
- Effectively evaluate, interpret, and summarize pharmaceutical and medical primary literature; recognize uses and limitations of different information resources
- Retrieve the standards of care/disease management protocols for various disease states (e.g. AHCPR, APhA, Chest, NHLBI, NCEP, JNCIV, FMHACCA etc.)
- Demonstrate effective communication skills, written and verbal, to preceptors, patients, physicians, and other health professionals
- Provide health care professionals with accurate, concise, and timely drug or drug therapy information
- Document and reference all drug information responses

- Identify, define, and report adverse drug reactions; reports to FMHCCA, and when appropriate, the P&T Committee and Board of Pharmacy
- Prepare a drug monograph for P & T Committee meeting
- Prepare a well-researched article for the institutional newsletter
- Prepare an in-service to the RPh/RN/MD staff.
- Prepare a drug utilization review/medication guideline/protocol
- V. Describe intradepartmental and interdepartmental dynamics to the facility
- Participate interdisciplinary continuing education activities with other health care practitioners (e.g. grand rounds, clinical conferences, in-service lectures)
- Attend and participate in journal club using an article published in the primary literature when opportunities exist
- Visit other departments in the internal medicine setting involved in diagnosis and treatment (e.g. E.R., critical care units, radiology, laboratory, anesthesiology, O.R., respiratory therapy, etc.) and describe the basic responsibilities of the department, its drug use policies and process, and its relationship with pharmacy
- Describe the pharmacist role in various Internal medicine committees (e.g. P&T, infection control, nursing, and pharmacy). The student should be scheduled to attend a committee meeting when possible and participate in providing background information for the committee to review
- Describe the various means the pharmacy department seeks reimbursement for its distributive and cognitive services. The student should discuss the procedures to follow in the institution in justifying reimbursement for pharmaceutical care
- VI. Demonstrate professional attitude and conduct
- Exhibit neatness and professionalism in appearance and work
- Accept constructive criticism, demonstrate receptiveness to feedback
- Demonstrate dependability, punctuality, courteousness, and tactfulness when dealing with patients and members of the health care team
- Maintain professional and ethical standards- compliance with laws and regulations, good professional judgment, reliability, and credibility when dealing with colleagues, patients, and other health care professionals



- Display self-directed (independent) learning, conduct self-assessment, develop a personal learning plan, and pursue knowledge independently
- Demonstrate competency in organizing and planning, establish management skills, set meaningful and attainable goals and be consistently well prepared
- Maintain confidentiality
- Display a patient and empathetic attitude towards patients including appropriate body language showing genuine interest in the well-being of the patient
- Respond to assignments in a timely manner and is consistently on time and ready for work upon arrival, with no unexcused absences

### **Task List for internal medicine inpatient care Rotations**

A list of specific tasks has been established for each of the required rotations to serve as a guide to the minimum requirements necessary to demonstrate competency. Provided below are samples of a few of the tasks defined for each specific core experiential rotation. Reasonable effort should be made to accomplish these tasks when possible.)

- Actively participate in rounds on a daily basis. Attend conferences required of the medical team (e.g. Grand Rounds, Teaching Rounds, Case Conference, etc.).
- Discuss at least 2 therapeutic guidelines relevant to the acute care site's patient population.
- Assess all potential ADEs. Complete adverse drug events and medication error report as per national or school designed ADEs/medication error reporting form and guidelines.
- Develop/Document written formative responses from preceptor, patients, caregivers or prescribers (4).
- Interface with pharmacy staff regarding unusual medication orders, patient issues, non-formulary needs, etc.
- Present patients to preceptor (and others) (Pharmacotherapy Rounds): List patient problems, drug therapy, monitoring parameters, therapeutic end-points, dosage, potential ADRs and interactions. Discuss appropriateness of current or alternate medication/doses and nutritional therapies.

- Assess and monitor applicable doses and medication therapy outcomes (including potential ADEs) in relation to renal function, pharmacokinetic analysis of serum concentrations and other lab or quantitative or clinical monitoring parameters, if available.
- Perform medication dosage form conversion on medications that are typically converted from intravenous to oral dosing whenever possible or prior to patient discharge. It also involves review of situations during which conversion is appropriate, benefits of such conversion, and appropriate conversion guidelines.
- Perform renal / hepatic dosing optimization for medications commonly used in the inpatient care depending on pertinent laboratory values
- Conduct at least 8 patient interview to obtain drug histories (refer to activities schedules for due dates)
- Write a 2 page (maximum) SOAP note. Three per 4 week rotation
- Submit 4 adverse drug events and 8 medication errors identified during the 4 week rotation. Submit timely projects and student portfolios assigned by the preceptor

The following description further explains the core activities to be performed.

The student shall attend Conferences, Morning Report, Grand Rounds, and medical Resident's Conference. The student may attend other conference as determined by the preceptor.

### **Patient Care:**

1. **Rounds:** The student is expected to actively participate in rounds on a daily basis. Team members should feel free to ask the student questions and ask them to research drug-related issues within a reasonable time period. Any responses to drug information requests or recommendations should be made at this time unless it was more prudent to provide the information/recommendation earlier in the day. The

student should document clinical interventions/drug information requests on the appropriate form.

2. **Patient Monitoring:** The student should be monitoring the drug therapy of all patients on their team at all times. A complete database on each patient should be kept. Students should obtain necessary patient data in the morning so patients can be reviewed with a preceptor in the afternoon.
3. **Drug Information Requests:** During the morning the student should work on any requests for drug information that they have received from the team. Responses should be reviewed with the preceptor during the afternoon meeting or earlier if information is needed by the team prior to that time.

### **Oral and Written Communication**

1. **Case Presentations:** Each day the student will informally present the patients currently assigned to their team.
2. **Written Drug Information:** If requested by the preceptor, the student will write a newsletter article or drug class summary. The preceptor will provide the student with a list of potential topics. The student may then choose the topic they would prefer to work on.
3. **Journal Club:** The student will review a recently published study that pertains to pediatric patients. The study will be presented at journal club. Attendees will include other pharmacy students, pharmacy faculty, and pharmacy staff members if available. The article should be approved by the preceptor. Please see the journal club information sheet for more details on choice of article and format for presentation format.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending medical wards, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Clerkship Title: Pediatrics Clerkship Rotation Syllabus****Clerkship Code: Phar5195****Clerkship EtCTS: 7****Pre-requisites: accomplishment of all didactic and Laboratory based courses Year I – Year IV****Co-requisites: None****Clerkship Description:**

- The purpose of Pediatrics clerkship is to train student to provide pharmaceutical care to pediatric patients

**Specific Goals**

- To provide the student with an understanding of pediatric patient care in the clinical setting.
- To develop a knowledge base of common pediatric disease states and their therapy.
- To learn to apply therapeutic and pharmacokinetic principles to the pediatric patient.
- To develop an appreciation of the pharmacist's role in monitoring drug therapy in the pediatric patients.
- To be able to evaluate the appropriateness of drug therapy in pediatric illnesses.

- To be able to interact with the pediatric care system as a participant.
- To develop an understanding of drug dosage and formulation problems unique to pediatric drug therapy.

**Clerkship Objectives:** After completing this rotation, the student will be able to:

### **Provide Direct Patient Care**

1. Collect and organize all patient-specific information needed to detect and resolve drug related problems and to make appropriate drug therapy decisions in pediatric patients
  - Identify the types of information needed to detect and resolve problems
  - Discuss signs and symptoms, epidemiology, risk factors, pathogenesis, pathophysiology, natural history of disease, clinical course, etiology, and treatment of common diseases in pediatric patients
  - Discuss the mechanism of action, pharmacokinetics, pharmacodynamics, usual regimen (dose, schedule, form, route, and method of administration), indications, contraindications, interactions, adverse reactions, relative efficacies, and pharmacoeconomics of drugs used in pediatric patients
  - Identify the differences that may occur in the pharmacokinetics and pharmacodynamics of drugs due to the developmental stage of a pediatric patient
2. Determine the presence of any of the following problems or concerns related to a patient's current drug therapy
  - a. Drugs used with no medical indication
  - b. Medical conditions for which there is no drug prescribed
  - c. Drugs prescribed inappropriately for a particular medical condition
  - d. Anything inappropriate with the current regimen (dose, schedule, route of administration, method of administration)
  - e. Presence of therapeutic duplication
  - f. Drugs to which a patient is allergic
  - g. Presence or potential for adverse drug reactions

- h. Presence of clinically significant drug-drug, drug-disease, drug-nutrient, or drug laboratory test interactions
- 3. Design pharmacotherapeutic regimens
  - Using an organized collection of patient-specific information develop a problem list
  - Specify pharmacotherapeutic goals for a patient that integrate patient-specific, disease-specific and drug-specific information and economic, ethical, and QOL considerations
  - Design a regimen, including modifications to existing therapy, which meet pharmacotherapeutic goals established for a patient
- 4. Design monitoring plans for drug therapy regimens
  - Determine parameters to monitor that will measure achievement of pharmacotherapeutic goals for a regimen
  - Define a desirable value range for each selected parameter taking into account patient-specific information
- 5. Recommend regimens and corresponding monitoring plans to a prescriber in a way that is systematic and logical and secures consensus from the prescriber.
- 6. Modify a plan as necessary based upon evaluation of monitoring data
- 7. Document all pharmaceutical care activities appropriately
- 8. Participate effectively in patient care rounds
  - Formulate appropriate responses to drug information requests and drug policy questions occurring during patient care rounds
  - Demonstrate a commitment to maintaining a database to support participation in patient care rounds

## **Provide Information Services**

9. Provide concise, applicable, and timely responses to requests for information from members of the health care team.

- Appropriately elicit all background information necessary to respond to a request for drug information
- Identify the most appropriate sources of information on the use of drugs in pediatric patients
- Formulate a systematic, efficient, and thorough procedure for retrieving drug information.
- Efficiently utilize both manual and computerized sources of drug information
- Evaluate the quality of literature gathered
- Effectively communicate responses to the requestor and/or team

10. Prepare written information on drug therapy

- Write a newsletter article on a topic that is timely and is of interest to the intended audience.
  - Prepare a drug class review in a table format.
1. Prepare and orally disseminate information related to drug therapy in pediatric patients.
- Effectively present cases informally and formally to preceptors and other students.
  - Effectively present an article as part of journal club.

## **Clerkship Task lists/ Responsibilities**

The responsibilities of the student during this rotation shall include the following:

1. Attend daily patient work rounds in addition to attending rounds and other educational pediatric conferences as may be scheduled.
2. Provide drug information when appropriate to other members of the health care team.
3. Monitor patients' drug therapy for therapeutic effect, adverse drug reactions, and drug interactions.

4. Provide patient counseling and education concerning drug therapy during hospitalization and at discharge, where possible.
5. Participate in formal and informal consultations, including detailed literature searches.
6. Provide in-service education for health professionals, when appropriate.
7. Attend conferences that pertain to drug therapy and patient care.
8. Participate in emergency situations, when possible, including the preparation of emergency drugs and provision of drug information.
9. Obtaining complete and accurate medication records for each patient.
10. Presenting patient-related information completely, succinctly, and accurately during rounds with preceptor as well as other health care professionals when queried.
11. Evaluate the literature on a specific topic pertaining to a patient's therapy. Completing and presenting one literature searches relating to a pediatric drug therapy.
12. Submit 2 written pharmaceutical care service given with a maximum of 2 pages using SOAP format
13. Submit 4 written drug information responses that the student gave during the rotation
14. Submit 4 adverse drug events and 8 medication errors encountered during the rotation that comprises portfolio requirements in pediatric rotations

## **Core Activities**

The following activities are described in detail as a guide for more focused student activity in pediatrics ward.

### **1. Patient Care:**

- **Rounds:** The student is expected to actively participate in rounds on a daily basis. Team members should feel free to ask the student questions and ask them to research drug-related issues within a reasonable time period. Any responses to drug information requests or recommendations should be made at this time unless it was more prudent to provide the information/recommendation earlier in the day. The student should document clinical interventions/drug information requests on the appropriate form.



**Patient Monitoring:** The student should be monitoring the drug therapy of all patients on their team at all times. A complete database on each patient should be kept. Students should obtain necessary patient data in the morning so patients can be reviewed with a preceptor in the afternoon.

**Drug Information Requests:** During the morning the student should work on any requests for drug information that they have received from the team. Responses should be reviewed with the preceptor during the afternoon meeting or earlier if information is needed by the team prior to that time.

### **1. Oral and Written Communication**

**Case Presentations:** Each day the student will informally present the patients currently assigned to their team.

**Written Drug Information:** If requested by the preceptor, the student will write a newsletter article or drug class summary. The preceptor will provide the student with a list of potential topics. The student may then choose the topic they would prefer to work on.

**Journal Club:** The student will review a recently published study that pertains to pediatric patients. The study will be presented at journal club. Attendees will include other pharmacy students, pharmacy faculty, and pharmacy staff members if available. The article should be approved by the preceptor. Please see the journal club information sheet for more details on choice of article and format for presentation format.

### **Student Readings**

During the rotation the student is expected to complete the readings to be suggested by preceptors. Articles on the following diseases states are required: Developmental Pharmacology, Asthma, Meningitis, Pneumonia, Antimicrobial Therapy for Infants and Children, GERD, Seizure disorders , Bone and soft tissue infections, Rheumatic heart disease, Fluid and electrolytes (diarrhea, dehydration, calculating fluid requirements), Cystic fibrosis , UTI, Diabetes, Nutritional disorders and neonatal respiratory distress syndromes.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending pediatrics care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Clerkship Title: Surgery Clerkship Syllabus**

**Clerkship Code: Phar5195**

**Clerkship EtCTS: 3**

**Pre-requisites: accomplishment of all didactic courses Year I – Year IV**

**Co-requisites: None**

**Clerkship Description:**

- This rotation will be conducted in surgical wards under department of surgery. The student should collaborate with other health care providers for the pharmaceutical care needs of the patients.

**Clerkship Goals**

1. To become familiar with the provision of clinical pharmacy services to surgery patients.
2. To be responsible for providing accurate and timely drug information to surgical team and other health care professionals related to a surgery service.
3. To gain a general understanding of the medications involved with a surgery service with emphasis on antibiotic therapy, nutritional support, and pain management.

**Clerkship Objectives:** At the completion of this rotation, the student should be able to:

- Consistently obtain complete and accurate drug histories including previous adverse reactions to medications.
- Present well-organized and accurate patient case histories including subsequent problem-plan management.
- Effectively and appropriately communicate with both patients and other health care professionals.
- Punctually and thoroughly complete and present the results of a literature search related to a disease, medication, or surgery performed on a surgery service.
- Spend the necessary amount of time in the patient care area to complete all service responsibilities related to his/her patients.
- Initiate interactions with other health care professionals.
- Understand the pathophysiology and pharmacology of the medications used on a surgery service with special emphasis on antibiotics and pain management.
- Understand the fundamental principles of acid-base balance, and fluid and electrolyte therapy.
- Have a general understanding of the role of parenteral and enteral nutrition in the surgery patient.
- Recognize and monitor adverse effects of medications and make a rational decision for their prevention and/or treatment.
- Understand the controversies involved with deciding which drug is the most effective and least toxic drug in specific clinical situations.
- Calculate a measured creatinine clearance given the appropriate data.
- Discuss the effects of renal and/or liver disease on the appropriate dosing of medications.
- Quickly and accurately calculate doses for medications used on the surgery service with emphasis on antibiotics and pain relievers.
- Realize that medication-related questions from health care professionals should only be answered when all of the relevant facts are known and that accuracy is of highest priority.
- Promptly and accurately search and answer questions from health care professionals when the answer is not initially known.

- Realize the importance of patient confidentiality.
- Know how to decide the order of priority for monitoring patient medications when on a busy surgery service.

### **Clerkship Task Lists**

The following **task list/ responsibilities** will include but are not limited to the following:

2. Punctual attendance at daily morning rounds with the assigned surgery team.
3. Punctual attendance at clinical pharmacy conferences.
4. Completely, accurately, and promptly responding to questions from health care professionals.
5. Initiating interactions with other health care professionals.
6. Filling out drug reaction forms for any undesired or unintended effect of a medication.
7. Completing and presenting two literature searches relating to a surgery topic.
8. Obtaining complete and accurate medication records for each patient.
9. Presenting patient-related information completely, succinctly, and accurately during rounds with preceptor as well as other health care professionals when queried.
10. Deciding which medications to use and how to use them with reference to pharmacokinetics and pharmacodynamics.
11. Completely and accurately evaluating the medications of all assigned patients on the surgery service.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending surgical wards care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Module 20: Elective clerkship module****Module name:** Elective clerkship module**Module category:** Elective**Module code:** Phar-M5202**Module Number:** 20**Module weight in ECTS:** 3**Courses:**

Pharmaceutical industry (Phar5201)  
Pharmaceutical quality control (Phar5202)  
Pharmaceutical regulatory (Phar5203)  
Oncology & Hematology clerkship (Phar5205)  
Ophthalmology & ENT clerkship (Phar5204)  
Dermatology clerkship (Phar5206)  
Emergency medicine clerkship (Phar5207)  
Pharmaceutical whole sale & promotion (Phar 5209)  
Nuclear pharmacy (Phar 5208)

**Module description:** This Module contained courses which students are to choose one among them. This will help the students delineate their future carrier, i.e., it is designed in such a way as to suit for the interest and competence of students who are interested to pursue their future career in one of the following courses: pharmaceutical industry, Pharmaceuticals quality control,

Pharmaceutical regulatory, Pharmaceutical whole sale & promotion, Nuclear pharmacy, oncology & hematology clerkship, Ophthalmology & ENT clerkship, Dermatology clerkship, and emergency medicine.

**Module objective:** course specific

**Module competency:** the students should develop this competencies based on their choice of course

- Organize and control the manufacturing, compounding and packaging of pharmaceutical products
- Provide pharmacist-initiated care to patients and ensure the optimal use of medicines

**Mode of delivery:** Parallel

**Mode of Assessment:** The assessment criteria are based on continuous assessment of class activities, individual and group assignment, attachments and report writing, test and final exams.

**Module learning teaching methods**

Case presentation/morning session, patient chart review; ward rounds, journal club & seminar, project work, bedside teaching, visit to industries, whole sale, & regulatory bodies.

**Elective clerkship module Course Syllabi**

**Clerkship Title: Oncology and Hematology Clerkship Syllabus**

**Clerkship Code: Phar5205**

**Clerkship EtCTS: 3**

**Pre-requisites:** accomplishment of all didactic and Laboratory based courses Year I – Year IV

**Co-requisites:** None

**Clerkship Description:**

- This clerkship program will be conducted at oncology center of a hospital to integrate pharmaceutical care and Clinical Pharmacy concepts and oncology patient care

through patient care activities, case discussions, and others. The student is expected to provide pharmaceutical care to oncology patients.

**Clerkship Objectives:** At the completion of this clerkship, the student should be able to:

## **1. Neoplastic Diseases**

- Describe the general course of the disease including the clinical findings, diagnosis, complications of disease, and prognosis.
- Describe the histopathologic classification and staging of the malignancy.
- Define the goals and rational treatment programs including surgical, radiological, pharmacological, and immunological.
- Identify the agent or combination of agents of choice including rationale, dose, schedule, and potential toxicities.

## **2. Chemotherapeutic Agents**

- Discuss the pharmacology including mechanism of action, adverse reactions, dose ranges, and pharmacokinetics of the common cancer chemotherapeutic agents, hormonal and immunotherapeutic agents, and monitor their use in patients with cancer.
- Recommend dosage adjustments based on renal function tests, liver function tests, and hematologic or other indices.
- Discuss cancer chemotherapy with respect to cell kinetics.
- Discuss the rationale for induction, consolidation, maintenance, and adjuvant chemotherapy.
- Describe the agents implicated, time course, reversibility, symptoms, and predisposing factors for chemotherapy-induced adverse reactions including pulmonary disease,

nephrotoxicity, cardiac toxicity, neurotoxicity, hepatotoxicity, radiation recall, gastrointestinal toxicity, hematologic complications, metabolic toxicity, and secondary malignancy.

### **3. Radiation Therapy and Surgery**

- Discuss the role of diagnostic, palliative, and curative radiation therapy and surgery in cancer management.
- Understand the monitoring and management of the complications associated with radiation therapy and surgery.

### **4. Nausea and Vomiting, Pain control**

- Recommend appropriate therapy with consideration of the proper drug, dose, and regimen.
- Know the relative onset, duration, and severity of nausea and vomiting with different chemotherapeutic agents.
- Describe nondrug methods for antiemetic control.

### **5. Transfusion Therapy**

- Discuss the use of blood products in cancer therapy including red blood cells, white blood cells, and platelets.
- Suggest premedication regimens to help reduce hypersensitivity reactions to blood products.
- Know the complications associated with the use of transfusion products.

### **6. Infectious Disease**



- Describe the types of bacterial and nonbacterial infections seen in patients with cancer.
- Recommend and monitor appropriate antibiotic therapy in patients with cancer with respect to patient specific factors.

## **7. Chemotherapy Extravasations**

- List drugs that are vesicants.
- Comprehend the management of extravasations.

### **Clerkship Activities:**

- Round with the multidisciplinary team and demonstrate appropriate interpersonal, leadership and collaboration skills. In addition, the student will provide pharmacotherapeutic recommendations
- Evaluate drug therapy regimens for appropriateness of drug, dose, and dosage regimen, route/method of administration, compliance, therapeutic duplications, therapeutic outcomes, cost, adverse drug reactions, and interactions.
- Design effective therapeutic regimens when therapy is initiated to best address patient specific goals and outcomes. Regimens should be guided by evidence based medicine.
- Design monitoring plans to achieve appropriate efficacy outcomes and avoid unwarranted adverse events/side effects with commonly used antineoplastic agents.
- Meet daily with preceptor to review patient care issues to ensure items have been addressed.
- Provide timely responses to formation requests from the team, nursing, pharmacists, preceptor, and other health care providers.

- Counsel patients/caregivers when newly diagnosed or changes are made to routine home medications.
- Participate in preparing cytotoxic medications
- Document clinical activities and interventions and report ADEs and Medication error

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending oncology wards care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at oncology wards.....50%
- Portfolio preparation and submission.....25%
- Clinical pharmacy Related Presentation – formal case presentation , Journal Club presentation, seminar.....10%
- Oral/ viva/ & Written Examination .....15%

**Clerkship Title: Ophthalmology and ENT Clerkship syllabus**

**Clerkship Code: Phar5204**

**Clerkship EtCTS: 3**

**Pre-requisites: accomplishment of all didactic and Laboratory based courses Year I – Year IV**

**Co-requisites: None**

**Clerkship Description:**

- The primary purpose of this clerkship is to develop an understanding of pharmacotherapy for the patients followed by Ophthalmology and ENT ward. The main focus will be

providing pharmaceutical care for patients with glaucoma and infectious disease of the eye, ear, nose and throat

**Clerkship Objectives:** At the completion of this rotation, the student should be able to:

- Authoritatively discuss the pathophysiology and pharmacotherapy disease states seen.
- Demonstrate the ability to identify specific drug-related problems for patients with acute and/or chronic illness.
- Authoritatively discuss the therapeutic plans of the patients encountered on the wards
- Identify optimal variables for monitoring patients including the identification of adverse drug reactions.
- Conduct monitoring of patient's drug therapy.
- Write a complete and formal drug information response
- Provide patient education regarding the optimal use, expected outcomes, and adverse effects of drug therapy regimens.
- Work with other health care professionals to ensure the safe, correct, and cost-efficient administration of medications.

**Clerkship Activities:** The responsibilities of the students during this rotation shall include the following:

- Round with the multidisciplinary team and demonstrate appropriate interpersonal, leadership and collaboration skills for admitted patients at the ward.
- Closely follow patients from a medical team in the ward as assigned by the preceptor.

- Closely review all the drug therapy of each patient being followed (for both outpatient and inpatient) including pharmacology, toxicology, pharmacokinetics, drug interactions, and monitoring parameters. From these data, a therapeutic plan will be developed.
- Provide timely responses to drug information requests from the team, nursing, pharmacists, preceptor, and other health care providers.
- Counsel patients/caregivers when newly diagnosed or changes are made to routine home medications up on discharge. Emphasize on counseling administration technique and handling of glaucoma medication/eye drops, at least complete 5 patient counseling sessions on administration and adherence to glaucoma medications.
- Complete at least 2 drug related problems identified and the care plan
- Document all patient care activities in manner outlined by the preceptor.
- Prepare and give a formal presentation.

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending surgical wards care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
- Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Clerkship Title: Dermatology Clerkship Syllabus**

**Clerkship Code: Phar5204**

**Clerkship EtCTS: 3**

**Pre-requisites: accomplishment of all didactic and Laboratory based courses Year I – Year IV**

**Co-requisites: None**

**Clerkship Description:**

- The primary goal of this rotation is to give the student an understanding of the recognition, diagnosis, and treatment of common dermatologic disorders and monitoring the safe and effective use of medications. Patients seen are out patients at dermatology clinic. The students shall have authoritative understanding of the different dermatologic preparation and their administration technique.

**Clerkship Activities**

- Conduct patient interview to organize and collect pertinent patient data including past medical history, past and current medication therapy
- List common drugs that are responsible for drug – induced skin reaction during the rotation
- Identify common drug – induced dermatological conditions
- Design and implement therapeutic plan for the conditions identified
- Design a monitoring plan for the care plan
- Write at least one detailed report of drug- induced skin reaction
- Provide timely responses to drug information requests from the team, nursing, pharmacists, preceptor, and other health care providers.

**Clerkship Title**  
**Clerkship code**  
**Clerkship EtCTS**  
**Clerkship**  
**Description**

**Emergency Medicine Clerkship**

**Phar5207**

**3 (81 hours)**

The purposes of this attachment is to promote understanding of the ways in which pharmacists contribute to care in the Emergency medicine and to suggest future directions for the role of pharmacists in providing that care.

- working with emergency physicians, emergency nurses, and other healthcare professionals to develop and monitor medication-use systems that promote safe and effective medication use in the Emergency medicine, especially for high-risk Emergency medicine patients and procedures;
- Collaborating with emergency physicians, emergency nurses, and other healthcare professionals to promote medication use in the Emergency medicine that is evidence-based and aligned with national quality indicators;
- Participating in the selection, implementation, and monitoring of technology utilized in the medication-use process;
- Providing direct patient care as part of the interdisciplinary emergency care team;
- Participating in or leading emergency preparedness efforts and quality improvement initiatives;

Educating patients, caregivers, and healthcare professionals about safe and effective medication use

**Clerkship**  
**Objectives**

At the completion of this rotation:

**Patient care:** In Hospital-Based Emergency Care together with the Emergency medicine care team the student should be able to ensure appropriate fulfillment of patient medication needs thereby to reduce or eliminate medication errors, and to evaluate for cost-effective medication therapy for the patient and hospital. As part of the interdisciplinary Emergency medicine care team, pharmacists can provide care to critically ill patients by:

- participating in resuscitation efforts;

- providing consultative services that foster appropriate evidence-based medication selection;
- providing consultation on patient-specific medication dosage and dosage adjustments;
- providing drug information consultation to emergency physicians, emergency nurses, and other clinicians;
- monitoring for patient allergies and drug interactions;
- monitoring patient therapeutic responses (including laboratory values);
- continuously assessing for and managing adverse drug reactions; and
- Gathering or reviewing medication histories and reconciling patients' medications.

In addition to the above, students can provide care to ambulatory patients in the Emergency medicine by:

- modifying medication regimens based on collaborative practice agreements for management of certain patient populations who return to ED;
- offering vaccination screening, referral, and administration;
- providing patient and caregiver education, including discharge counseling and follow-up; and
- Providing information on obtaining medications through patient assistance programs, care funds, and samples.
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### **Emergency preparedness planning.**

Students expected to acquire basic knowledge to assertively exercise their responsibilities in preparing for and responding to disasters because treatment of disaster victims almost always involves the use of pharmacologic agents and ensuring the efficacy and safety of the medication-use process is a natural role for pharmacists.

**Quality improvement initiatives.** Students are expected to acquire basic knowledge about:

- guiding the development of evidence-based treatment protocols, algorithms, and/or clinical pathways that are congruent with nationally accepted practice guidelines and quality indicators;
- assisting in the development, implementation, and assessment of various technologies used throughout the ED medication-use process;
- conducting failure mode and effects analysis and root cause analysis on error-prone aspects of the medication-use process;
- participating in ED-based and hospital-wide committees (e.g., P&T, infection control, disaster) that impact medication use in the ED;
- Assisting in surveillance and reporting of adverse drug reactions.

**Education.** The will able to provide education and information to healthcare professionals, patients, and the public they come in contact with in the health systems' emergency service areas.

**Mode of Delivery**

- Ward round
- Bed side teaching
- Morning case presentation
- Journal club
- Mid-rotation (i.e., interim) evaluation



**Mode of  
assessment**

- An exit evaluation
- Case presentation
- Document submission
- Attendance (on time attendance)

The evaluation will have both subjective and objective components and the major areas of student performance that are to be considered in student evaluation include but are not limited to:

- The student's knowledge base
- The student's decision making skills: which include his/her judgment and problem solving skills
- The student's ethics and morality- includes academic honesty, integrity, truthfulness
- The student's communication skills – includes written and oral communication with patients and health care providers
- Integrity in case of case document submitted.

Counsel patients/caregivers when newly diagnosed or changes are made to routine home medications up on discharge

**Mode of delivery:** Case presentation/morning session, Patient Chart review, attending surgical wards care team, bed side teaching, Journal Club presentation, project work and seminar

**Mode of assessment:**

- Attendance and daily rotation activities at drug information center.....40%
- Portfolio preparation and submission.....20%
- Clinical pharmacy Related Presentation – formal case presentation, Journal Club
  - Presentation, seminar.....10%
- External exam .....20%
- Written Examination .....10%

**Clerkship content:**

**A. ward activities**

1. Attend and actively participate in ward rounds and attending rounds according to the schedule of the service.
2. Each student will make a verbal presentation in fifteen minutes or less of any patient for which s/he is responsible. Each patient presentation should include the following elements;
  - a. Patient's name, age, sex
  - b. Reason for admission and chief complaint
  - c. History of present illness
  - d. Significant medical history
  - e. Present medication history
  - f. Summary of review of systems and physical examination
  - g. Admission of laboratory values
  - h. Pharmaceutical considerations

An evaluation of current therapy

Proposed alternative therapies

Monitoring parameters for therapeutic response and toxicity

Any pharmacokinetic parameters applicable endpoints of therapy

3. Interview and obtain medication histories from all patients assigned by the pharmacy preceptor.
4. Monitor drug therapy of all assigned patients.
5. Students will apply the information obtained through the interviewing and monitoring process to:
  - A. evaluate current drug therapy
  - B. anticipates and identifies drug therapy problems
  - C. meets the objectives outlined in this syllabus
6. Provide patient specific drug information (verbally and/or in writing) to nurses, physicians, peers and pharmacy preceptors.
7. Counsel all assigned patients about their drugs.

**B. Non-ward activities**

Students will prepare and make at least one in-service presentation (s) to the clinicians on their unit on a drug or pharmacy related topic. All students will attend and participate in morning meeting and journal club presentation. Presenters are assigned by pharmacy preceptors in turn.

## References

Students should use the number 1 reference as guiding book and others to acquire pharmacotherapy knowledge.

- 1) Robert J. Cipolle, Linda M. Strand, Peter C. Morley Pharmaceutical Care Practice: The Clinician's Guide, 2nd Edition
- 2) Dipiro JT, Talbert RL, Yee GC, et.al. Pharmacotherapy, a Pathophysiologic Approach. 7<sup>th</sup> or later edition.
- 3) A Practical Guide to Pharmaceutical Care, American Pharmacists Association, 3<sup>rd</sup> edition.
- 4) Koda - Kimble MA, Young LY , Kradjan WA, et.al. Applied Therapeutics, The Clinical Use of Drugs. 9<sup>th</sup> or later edition.
- 5) Walker R and Edwards C. Clinical Pharmacy and Therapeutics. 3rd or later edition.
- 6) Atkinson A, Daniels C, Dedrick R, et.al. Principles of Clinical Pharmacology. 1<sup>st</sup> or later edition.
- 7) Kasper, Braunwald, et al. Harrison's Principles of Internal Medicine, 16<sup>th</sup> or later edition
- 8) Tierney, McPhee, Papadakis. Current Medical Diagnosis and Treatment 2008 or later edition
- 9) Conn's Current therapy 2008
- 10) Washington Manual of Medical Therapeutics 32<sup>nd</sup> edition
- 11) Jacobs & DeMott Laboratory Test Handbook, 5th edition
- 12) Guidelines and articles as specified by the instructor

**The Harmonized Modular curriculum has been approved by:**

**1. Head, School of Pharmacy**

**Name** \_\_\_\_\_

**Signature** \_\_\_\_\_

**Date:** \_\_\_\_\_

**2. The college/Faculty Dean**

**Name** \_\_\_\_\_

**Signature** \_\_\_\_\_

**Date:** \_\_\_\_\_