Wollo University
Kombolcha Institute of Technology
School of Mechanical and Chemical Engineering

Course Title: Systems Modelling and Simulation	**Course Code:** IEng3140 **Program:** *Undergraduate*
Pre-requisites Operations Research-I	**ECTS credit: 5ECTS/ 3Cr.Hr**
Class Year: 3rd / III	**Enrolment:** *Regular, Industrial engineering.*
Instructor: Haileluel M. (PhD)	**Academic year:** *2019/20 (2012EC)*

Course Objectives: After taking this course, successful students will be able to:

- Understand the various modeling methodologies and simulation techniques for the development of Manufacturing and servicing systems
- Select and apply the appropriate techniques to develop a particular system; and use of models for optimization, performance prediction, control, insight and justification of the system

Course Contents

Chapter 1: System and system Modeling

1.1 Introduction to systems and system modelling
1.2 Systems and System environment
1.3 Components of a System
1.4 Model of a System
1.5 What is a simulation and how it is done?
1.6 Steps in a simulation study

Chapter 2: Discrete Event Simulation (DES)

2.1 Discrete Event vs. Continuous Event Simulation
2.2 General Principles of DES
2.3 Simulation of Queuing Systems
2.4 Manual Simulation Using Event Scheduling

Chapter 3: Statistical Models in Simulation

3.2 Review of Terminologies and concepts
3.2 Continuous random variables
3.3 Cumulative distribution function
3.4 Discrete Distributions
3.5 Continuous Distributions

Chapter 4: Queuing Models

4.1 Introduction
4.2 Characteristics of a Queuing System
4.3 Service Facility Characteristics
4.4 Notations Used in Queuing Theory
4.5 Operating Characteristics of Queuing Systems

Chapter 5: Verification and Validation of Simulation Models

5.1 Model-Building, Verification, and Validation
5.2 Verification of Simulation Models
5.3 Calibration and Validation

Chapter 6: Simulation Modeling with ARENA

6.1 Introduction to Arena Software Package
6.2 The Basic Process Panel

- ✓ Assignments . . . .15 %
- ✓ Lab 15%
- ✓ Quizzes 10%
- ✓ Mid Examination 20%
- ✓ Final Examination 40%

Attendance Requirement:

- . Minimum of 85% attendance during lecture hours and 100% during laboratory sessions

References

1. Discrete-Event System Simulation, 3rd Edition, J. Banks, J.S. Carson, II, B.L. Nelson, D.M. Nicol
2. Penny A.Kendall, Introduction to systems analysis & Design A structured Approach
3. Systems Modeling and Simulation Laboratory manual, Melkamu M. and Betsha T (2014)