

**Wollo University**  
**Kombolcha Institute of Technology**  
**Department Hydraulic and Water Resources Engineering**

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<b>Postgraduate Program</b>	<b>: M.Sc. in Hydraulic Engineering</b>
<b>Course title</b>	<b>: Concrete Dams</b>
<b>Course code</b>	<b>: HE 6022</b>
<b>Credit hours</b>	<b>: 3 credit (6 ECTS)</b>
<b>Semester</b>	<b>: II, 2019/2020</b>
<b>Instructor</b>	<b>: Fikru Fentaw (Dr.)</b>

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**1. Basic Concepts of Hydraulic Structures**

- 1.1. Introduction
- 1.2. Classification of dams
- 1.3. Selection of sites for dams
- 1.4. Selection of type of dams
- 1.5. Investigation of dam and reservoir sites
- 1.6. Foundation investigation

**2. Design and Analysis of Gravity Dams**

- 2.1. General
- 2.2. Loads and Load Combinations of Gravity Dams
- 2.3. Stability Analysis for Gravity Dams
- 2.4. Stress Analysis for Gravity Dams
- 2.5. Profile Design for Gravity Dams
- 2.6. Foundation Treatment and Preparation for Gravity Dams
- 2.7. Roller Compacted Concrete (RCC) and Other Types of Gravity Dams

**3. Design and Analysis of Arch Dams**

- 3.1. General
- 3.2. Loads and Load Combinations
- 3.3. Stress Analysis for Arch Dams
- 3.4. Stability Analysis for Dam Abutments
- 3.5. Design of Dam Body
- 3.6. Materials and Structural Elements of Arch Dams
- 3.7. Foundation Treatment
- 3.8. Stone Masonry and RCC Arch Dams

**4. Design and Analysis of Buttress Dams**

- 4.1. General Introduction
- 4.2. Classification of Buttress Dams
- 4.3. Features of Buttress Dams
- 4.4. Massive-Head Buttress Dams
- 4.5. Flat-Slab and Multi-Arch Buttress Dams

**5. Design of Harbors, Locks (Navigations)**

- 5.1. General
- 5.2. Design of Harbors and Locks

**6. Dam Safety: Instrumentation and Surveillance**

- 6.1. Introduction
- 6.2. Instrumentation
- 6.3. Surveillance
- 6.4. Reservoir Hazard and Risk Assessment

**References:**

1. Novak, Moffat, Nalluri and Narayanan (2004), Hydraulic Structures, 3<sup>rd</sup> edition, Taylor & Francis
2. US Bureau of Reclamation (1987), Design of Small Dams, A water resources Technical Publication
3. Henry H. Thomas (1979), The Engineering of Large Dams Part I and II, John Wiley & Sons
4. Vischer and Hagar (1992), Dam Hydraulics, John Wiley & Sons
5. Garg (2006), Irrigation Engineering and Hydraulic Structures, Khanna Publishers
6. Janson (1988), Advanced Dam Engineering for Design, Construction & Rehabilitation, New York
7. Robin Fell et. Al. (2005) Geotechnical Engineering of Dams, Tylor and Francis Group
8. USSD (2012), Guideline for construction Cost estimation for Dam Engineers and Owners
9. Any Advanced Dam Engineering Books, Articles etc.