UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
CEE-441	Hydraulics	7
Prerequisites	**Department**	**Semester**
MENG-280	Engineering	Fall/Spring
Type of Course	**Field**	**Language of Instruction**
Required	Civil & Environmental Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Prof Demetris Drikakis	4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Introduce students to the main principles governing network hydraulics.
- Explain the theory of water flow in pipes and open channels and the importance of pressure forces and surface friction.
- Provide the fundamental knowledge on the design process of water and wastewater networks in urban areas.
- Become familiar with open channel cross sections, hydrostatic pressure distribution and Manning's law.
- Familiarize the students with the design process of drainage systems.
- Provide students the knowledge and the ability to take measurements in order to quantify the performance of a hydraulic system.
- Provide the tools and knowledge for proper engineering design of pipeline systems and hydraulic structures.
- Provide students hands-on experience through laboratory experiments.

Learning Outcomes:

After completion of the course students are expected to:

- Define fundamental principles and concepts of engineering hydraulic systems.
- Explain water flow in hydraulic structures.

- Identify the importance and the role of water pressure and pressure forces in hydraulic systems including the effects of surface friction.
- Explain and make use of the energy and momentum equations.
- Develop methods of analysis of fluid flow in pipelines and pumped distribution networks for urban areas.
- Analyse flow in closed pipes, and design pipes including the selection of sizes.
- Develop methods of analysis of water flow in open channels including man-made channels and rivers.
- Understand pumps classification and be able to develop a system curve used in pump selection.
- Design and select pumps (single or multiple) for different hydraulic applications.
- Determine water surface profiles for gradually varied flow in open channels
- Use techniques and graphs for the analysis of system performance and characteristics.
- Perform laboratory measurements and analyse data in order to characterize the performance of a hydraulic system.
- Utilize engineering tools and techniques to properly design a hydraulic system or structure.

Course Content:

- Fundamental properties of water
- Water pressure and pressure forces
- Hydraulic Processes: Flow and Hydrostatic Forces
- Water flow in pipes
- Pipelines and pipe networks
- Water pumps
- Water flow in open channels
- Hydraulic structures
- Water pressure, velocity, and discharge measurements
- Hydraulic design
- Conveyance systems: open channel flow
- Urban drainage systems.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises, discussion, projects, lab sessions.

Assessment Methods:

Mid-term exam(s), Homework assignments, lab reports, Final exam (comprehensive).

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Fundamentals of Hydraulic Engineering Systems, 5th Edition	R. J. Houghtalen, A. O. Akan, N. H. C. Hwang	Pearson	2016	978-0134292380

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Hydrology and Hydraulic Systems, 3rd Edition	R. S. Gupta	Waveland Pr. Inc.	2007	978-1577664550
Practical Hydraulics and Water Resources Engineering, Third Edition	Melvyn Kay	CRC Press	2016	9781498761956