Course Outline (Higher Education)

School: School of Engineering, Information Technology and Physical Sciences

Course Title: HYDRAULICS AND HYDROLOGY

Course ID: ENGIN2201

Credit Points: 15.00

Prerequisite(s): (ENCOR1021 or ENCOR2100 or ENGIN1002)

Co-requisite(s): Nil

Exclusion(s): (ENCIV2320)

ASCED: 030907

Description of the Course :

The key objective of this course is the development of the skills required to analyse and design an urban water supply system. This course also introduces students to fundamental hydrological and hydraulic theories. The unit places particular emphasis on the fundamental basis for the estimation of the flow in the catchment and open channel flow hydraulics and estimating runoff for design of drainage structures.

Grade Scheme: Graded (HD, D, C, etc.)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory						
Intermediate			✔			
Advanced						

Learning Outcomes:

On successful completion of the course the students are expected to be able to:

Knowledge:

K1. Describe the various forms of energy that are relevant to the flow of fluid, concepts of hydrostatics and pressure measurement and Reynolds number.

K2. Apply the appropriate equations for the solution of simple pipe flow problems.

K3. Identify the equations available for the analysis of flow within both single pipelines and more complex pipeline systems; and open channels.

K4. Explain the various components of hydrology and drainage systems.

K5. Describe the principles of methods for the estimation of peak discharges from a catchment and groundwater flows.

Skills:

S1. Calculate the water demand of communities; variation in demand and prediction of future requirements.

S2. Solve problems related to fluid statics, Bernoullis equation, energy equations.

S3. Solve losses in pipes using different approaches.

S4. Laboratory experiments to calculate friction losses and measure flows in hydraulic structures.

S5. Undertake rainfall and runoff estimation from rainfall and catchment data.

S6. Gain practical understanding of hydraulic gradient and application of Darcys equation.

Application of knowledge and skills:

A1. Apply the equations available for the analysis of flow in pipes and open channels for the solution of practical hydraulic problems.

A2. Measure and analyse flows in hydraulic structures.

A3. Apply the equations available for the design of hydraulic structures for the solution of practical engineering problems.

A4. Apply rainfall and runoff calculations and use appropriate procedures for the design of stormwater drainage systems.

Course Content:

Topics may include:

- Pipeline and pumping systems, pipe networks; steady open channel flow; flow control and flow measurement;
- Design and analysis of hydraulic structures;
- Precipitation and its analysis; rainfall and runoff estimation; stormwater management and planning;
- Soil moisture and soil water movement; Groundwater; sediment characterisation and sediment transport;
- Flood plain management

Values:

V1. Appreciate that while hydraulics and hydrology are already established engineering disciplines, rigorous analysis is essential in order to achieve high quality and reliable solutions.

V2. Appreciate the importance of various variables in the design of hydraulic structures and calculation of rainfall and runoff.

V3. Appreciate that while engineering design is a creative process, rigorous analysis is essential in order to achieve a high quality and optimal solution.

V4. Appreciate the importance of safety, environmental and community considerations in process of measuring flows.

Graduate Attributes

The Federation University FedUni graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		**Development and acquisition of GAs in the course**			
		Learning Outcomes (KSA)	**Code** A. Direct B. Indirect N/A Not addressed	**Assessment task (AT#)**	**Code** A. Certain B. Likely C. Possible N/A Not likely
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K5, S1-S3, S5, S6, A1-A4	A	1-3	A
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	Not applicable	Not applicable	Not applicable	Not applicable
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	K1-K5, S1-S6, A1-A4	B	1-3	B
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K3, S4, S6, A2-A3	B	2	B
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	Not applicable	Not applicable	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1 - K5, S1 - S6, A1 - A4	An assignment based around the design of an appropriate hydraulic and/or hydrologic system.	Group assessment including a report and/or presentation.	15 - 25%
K3, S4, S6, A2 - A3	Laboratory exercises and/or presentations & assessments	Report/Presentation/Quiz/Test	20 - 30%
K1 - K5, S1 - S6, A1 - A4	An examination on any or all of the course material.	Examination	40 - 60%

Adopted Reference Style:

Other (Refer to the library website for more information: IEEE)