



Course Specifications

Course Title:	Engineering Hydrology I
Course Code:	CE 311
Program:	B.Sc. in Civil Engineering
Department:	Civil Engineering
College:	Jubail University College
Institution:	Jubail University College

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A. Course Identification

1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Level 5, Third Year
4. Pre-requisites for this course (if any): CE 205 Engineering Fluid Mechanics	
5. Co-requisites for this course (if any): None	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	✓	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	45
3	Tutorial	
4	Others (specify)	
	Total	75

B. Course Objectives and Learning Outcomes

1. Course Description

CE 311 Engineering Hydrology I (2-3-3)

Prerequisite: CE205

The hydrologic cycle, precipitation, evaporation and transportation, infiltration stream flow, hydrograph analysis including unit hydrograph, occurrence of ground water, fundamentals of ground water flow including Darcy's Law and its applications, steady and unsteady flow to wells, laboratory sessions include experiments in fluid mechanics, surface and subsurface hydrology.

2. Course Main Objective

The main purpose of this course is to enable the students to acquire the knowledge of engineering principle used in hydrology and can solve various problems related to surface and subsurface water flow.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Explain hydrologic cycle and its elements.	8
1.2	Discuss various types of aquifers and their characteristics	8
2	Skills	
2.1	Analyze hydrological data.	1
2.2	Develop hydrographs for a drainage basin and perform hydrograph analysis	1
2.3	Evaluate various parameters of ground water storage and apply Darcy's law to ground water hydrology problems	1
2.4	Demonstrate the principles involved in fluid mechanics, surface and subsurface hydrology by conducting experiments and interpreting the data.	6
3	Values	
	N/A	

C. Course Content

No	List of Topics	Contact Hours
1	Unit 1. Hydrologic Cycle 1.1 Types of precipitation, Distribution of precipitation. 1.2 Water Balance Equation 1.3 Measurement of precipitation: Non recording and recording rain gauges 1.4 Analysis of point precipitation data. 1.5 Conversion of point Precipitation Data to Areal Precipitation 1.6 Evaporation from open water bodies. Evaporation using pans Evaporation from drainage basins. 1.7 Overland flow and base flow 1.8 Estimation of runoff using infiltration curve , Infiltration Indices	30
2	Unit 2. Hydrograph Analysis 2.1 Components of Hydrograph, Separation of base flow 2.2 Unit hydrograph: Derivation of Unit hydrograph, Changing the Unit Hydrograph duration 2.3 Lagging Method 2.4 S curve method, 2.5 Estimation of stream flow from Unit Hydrograph.	20
3	Unit 3. Ground Water Hydrology 3.1 Geologic Considerations, Darcy's Law 3.2 Permeability and Hydraulic Conductivity 3.3 Applications of Darcy's Law	10
4	Unit 4. Well Hydraulics 4.1 Confined steady flow to a well 4.2 Unconfined steady flow to a well 4.3 Confined unsteady flow to a well	15

	4.4 Unconfined unsteady flow to a well	
Total		75

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Explain hydrologic cycle and its elements.	Interactive learning Self-directed learning	Quiz 1, midterm, assignment 1
1.2	Discuss various types of aquifers and their characteristics		Quiz II, assignment II, final
2.0	Skills		
2.1	Analyze hydrological data.	Interactive learning Self-directed learning	Quiz 1, midterm, assignment 1
2.2	Develop hydrographs for a drainage basin and perform hydrograph analysis		Quiz II, assignment II
2.3	Evaluate various parameters of ground water storage and apply Darcy's law to ground water hydrology problems		Final
2.4	Demonstrate the principles involved in fluid mechanics, surface and subsurface hydrology by conducting experiments and interpreting the data.		Lab
3.0	Values		
	N/A		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4	5 %
2	Assignment 1	6	5 %
3	Mid-term LB	7	5 %
4	Mid-term LT	8	20 %
5	Quiz 2	12	5 %
6	Assignment 2	13	5 %
7	Final Exam -LB	16	10 %
8	Performance LB	16	10 %
9	Lab Record	16	5 %
10	Final Exam-LT	17-19	30%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Office hours 16 hr/week; students can go in times of office hours for teacher to explain what could not be understood from the lesson.
- Students can communicate with a staff member outside the official working hours by email.
- Students are also encouraged to visit their academic advisors.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Gupta, R. S. (2008). <i>Hydrology and Hydraulic System</i> . USA: Waveland Press
Essential References Materials	Ward, R.C. & Robinson, M. (2000). <i>Principles of Hydrology</i> . New York : McGraw-Hill Mays, L. W. (2012). <i>Ground and Surface Water Hydrology</i> . USA: John Wiley & Sons
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with a capacity of at least 25 students and fitted with multimedia projector and a computer.
Technology Resources (AV, data show, Smart Board, software, etc.)	None
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment as per QMS-Policy-006 Feedback Survey, QMS-QAP-116 Monitoring Students' Satisfaction	Students	Indirect: Analyzing the results of the following surveys Course Evaluation Survey(CES), Program Evaluation Survey (PES),

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		Student Experience Survey (SES)
Quality of Exam papers and Verifying Standards of Student Achievement as per QMS-Policy-004 Policy for Examinations and Marking, QMS-ACP-102 Procedure for Marking Examinations	Examination Committee	Direct: Peer review of examination papers and review or double check a minimum of three or 10% of answer papers. Verifying the entries in the Activity Mark Sheet.
Achievement of learning outcomes as per QMS-Policy-001 Course Review, QMS-CDP-106, QMS-CDP-112 Curriculum Review	Faculty	Direct: Course Report (Section B-3)
Implementation of the action plans based on previous semester as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS-CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-1, G-2)
Monitoring Teaching and Learning as per QMS-Policy-005 Monitoring of Teaching and Learning	Chairperson/Program Director/Course Director	Indirect: Feedback by Chairperson/Program director/Course director. Program Delivery Record.
Effectiveness of planned Teaching Strategies QMS-Policy-001 Course Review	Faculty	Indirect: Course Report (Section B-4)
Course effectiveness and planning for improvement as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS- CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-3)
Verifying Standards of Student Achievement and Quality of Exam papers as per QMS-ACP-119 External Assessment Review	Assessment External Reviewer	Direct: Report of assessment external reviewer. Review of sample of ten or 10% of student's assessments and coursework scripts.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Civil Engineering Department Council
Reference No.	REG MIN-CED-10
Date	27-04-2020

Appendix A Revision Details

Revision no.	DESCRIPTION	Reference MoMs			
		DC		CDC	
		Sem	#	Sem	#
1	Revision of Course Teaching Strategies and action verbs based on the comments of NCAAA reviewer	392	4	392	4
2	Course Specification Template 2018	402			