



50 Course Specification of Engineering Hydrology

I. Course Identification and General Information:					
1	Course Title:	<i>Engineering Hydrology</i>			
2	Course Code & Number:	CE 309			
3	Credit hours:	C.H			
		Th.	Tu.	Pr.	Tr.
		2			
4	Study level/ semester at which this course is offered:	4 th Level/ 2 st semester			
5	Pre –requisite (if any):	Mathematics and Statistics			
6	Co –requisite (if any):	Hydraulic, Sanitary Engineering and Irrigation			
8	Program (s) in which the course is offered:	Civil Engineering			
9	Language of teaching the course:	English+ Arabic			
10	Location of teaching the course:	Lecture hall			
11	Prepared By:	Prof. Dr. Abdulla Noaman			
12	Date of Approval				

II. Course Description:
<p>This course provides the basic skills to carry out the hydrologic analyses and designs that are often encountered in engineering practice. It is intended to introduce to the students information of engineering hydrology which is required for the design of storm water drainage systems, for the management of flooding and is also needed to determine how much water can be reliably obtained from water supply catchments and groundwater systems. The Related branches and applications include hydraulic, sanitary engineering and Irrigation</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Define the mathematical principles for conducting the probability and statistical analyses.	A1
a.2	Describe the hydrological processes over the catchment area.	A3
b.1	Identify the maximum runoff and design discharge to predict the sizes of reservoirs, drainage systems and flood-protection structures.	B.1
b.2	Analyze the Hydrological data, and Muskingum and linear reservoir theory for flood routing,	B.2
c.1	Use the field equipment for measuring the hydrological parameters over the catchment area.	C.1
c.2	Apply the Hydrological Modelling to identify the hydrological process over the catchment area	C3
d.1	Write a report on the hydrological studies required for water engineering projects.	D1

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a.1 Define the mathematical principles for conducting the probability and statistical analyses.	Lecture, exercises, Presentations, Tutorial Reading	Written exam
a.2. Describe the hydrological processes over the catchment area	Lecture, exercise Presentations	Written exam

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b.1 Identify the maximum runoff and design discharge to predict the sizes of reservoirs, drainage systems and flood-protection structures	Lecture, Presentations, exercise, field visits,	Problem set- Written exam- Written assignment-
b2. Analyze the Hydrological data, and Muskingum and linear reservoir theory for flood routing,	Lecture, Presentations, Tutorial, exercises	Problem set- Written exam

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c.1. Use the field equipment for measuring the hydrological parameters over the catchment area.	Lecture, field visit	Problem set, Participation- Written assignment- Written exam
c.2. Apply the Hydrological Modelling to identify the hydrological process over the catchment area	Lecture, Presentations, Tutorial, exercises	Problem set, Participation- Written assignment- Written exam

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Write a report on the hydrological studies required for water engineering projects.	Group project, graduation project	Exam.

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IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction to hydrology	a.1,a.2,b1, b2,d1	World's Water Resources Water Resources of Yemen Hydrology and Hydrologic Cycle Forms of Precipitation Scope of Hydrology Hydrological Data Hydrologic Equation	1	2
2	Precipitation	a.1, a2, b.1,c1,c2, d1	Types of Precipitation Rainfall characteristics Measurement of Precipitation	1	2
3	Runoff	a.1, a2, b.1,b2, c1,c2, d1	Components of Stream Flow Catchment Characteristics Factors Affecting Runoff Estimation of Runoff Runoff measurement	2	4
4	Hydrographs	a.1, a2, b.1,b2,,c2, d1	Hydrograph Components Unit Hydrograph Application of Unit Hydrograph	1	2
5	Hydrological abstraction	a.2,b1, b2, c2, d1	Types of losses Evaporation Evapotranspiration Infiltration Water Balance	1	2
6	Analysis of Hydrological data	a1,a.2,b1, b2, d1	Applied statics and probability Rainfall analysis Flood frequency analysis Estimates of Missing Data and Adjustment of Records	1	2

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7	Analysis of Hydrological data	a1,a.2,b1, b2, d1	Applied statics and probability Rainfall analysis Flood frequency analysis Estimates of Missing Data and Adjustment of Records	1	2
8	Stream Gauging	b.2,c1,c2, d1	Methods of Measuring Stream Flow Current Meter Gauging Stage-Discharge-Rating Curve	1	2
9	Flood estimation and control	a1,a3,b2,c 2,d1	Estimation of Peak Flood Methods of Flood Control Flood Forecasting and Warning	1	2
10	Flood routing	a1,a3,b2, c2, b1,d1	Reservoir Routing Stream Flow Routing	1	2
11	Groundwater	a1,a.2,b2, d1	Types of aquifers and formation Darcy's Law	3	6
Number of Weeks /and Units Per Semester				14	28

V. Teaching strategies of the course:

The course consists of twelve lectures, writing assignments including one field visit to the location of Meteorological stations and hydrological measurements. Lectures will be considered as interactive elements and not as a one-way process of transferring knowledge. Feedback from students will be taken into consideration in order that any lecture objectives which has been inadequately covered may be reviewed in the next lecture.

Tools:

Lectures, Multimedia Presentations, Presentations, Reading, Field visits and writing assignments

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VI. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Identify the design discharge to predict the sizes of water structures	a.2,b1, b2,c1	6	2.5
2	Field visit report on the Measurements of the Hydrological parameters in the catchment area.	b1,b2,c1,c2	10	2.5

VII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Written assignment	6 and 10	5	5	A2,b1, b2, c1,c2,d1,
2	Quizzes.	Two time randomly	5	5	a1,a2, b1,b2,c1,c2,d1,
3	Mid-term exam.	7 th	20	20	a1,a2, b1,c1,c2
4	Final-exam.	13 th	70	70	a1,a2, b1,b2,c1,c2,d1
	Sum		100	100%	

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VIII. Learning Resources:

Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

العنوان	Engineering Hydrology
المؤلف	Victor Miguel Ponce
الناشر	Prentice Hall PTR, 1994
رقم ISBN (الرقم الدولي المعياري للكتاب)	0133154661, 9780133154665
العنوان	هيدرولوجية المياه الجوفية ومبادئ في المياه السطحية
المؤلف	خليفة عبدالحافظ درادكة
الناشر	دائرة المطبوعات والنشر. عمان الاردن

2- Essential References.

2005, Tata McGraw, New Delhi K Subramanya's Engineering Hydrology 4th

3- Electronic Materials and Web Sites etc.

1-<http://www.flipkart.com/engineering-hydrology-4e-english>

2-<http://www.aboutcivil.org/hydrology.htm>

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IX. Course Policies:	
1	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	Tardy: The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.
3	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
4	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries .
6	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7	Other policies: <ul style="list-style-type: none"> - All the teaching materials should be kept out the examination hall. - The mobile phone is not allowed. - There should be a respect between the student and his teacher.

Reviewed By	<u>Vice Dean for Academic Affairs and Post Graduate Studies</u> <u>Dr. Tarek A. Barakat</u> <u>Dr. Mohammad Algorafi</u>
	<u>Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa</u> <u>Dr. Ahmed mujahed</u> <u>Dr. Munaser Alsubri</u>

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Template for Course Plan (Syllabus)

I. - Information about Faculty Member Responsible for the Course:						
Name of Faculty Member	Prof. Abdulla Noaman		Office Hours			
Location & Telephone No.	777725220		SAT	SUN	MON	TUE
E-mail	abnoman@hotmail.com					

II. Course Identification and General Information:					
1	Course Title:	Engineering Hydrology			
2	Course Number & Code:	CE 309			
3	Credit hours:	C.H			
		Th.	Tu.	Pr.	Tr.
		2			
4	Study level/year at which this course is offered:	4 th Level/ 2 st semester			
5	Pre –requisite (if any):	Mathematics and Statistics			
6	Co –requisite (if any):	Hydraulic, Sanitary Engineering and Irrigation			
7	Program (s) in which the course is offered	Civil Engineering			
8	Language of teaching the course:	English+ Arabic			
9	System of Study:				
10	Mode of delivery:				
11	Location of teaching the course:	Lecture hall			

III. Course Description:

This course provides the basic skills to carry out the hydrologic analyses and designs that are often encountered in engineering practice. It is intended to introduce to the students information of engineering hydrology which is required for the design of storm water drainage systems, for the management of flooding and is also needed to determine how much

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water can be reliably obtained from water supply catchments and groundwater systems. The Related branches and applications include hydraulic, sanitary engineering and irrigation.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:
- a.1** Define the mathematical principles for conducting the probability and statistical analyses. A1
- a.2** Describe the hydrological processes over the catchment area. A3
- b.1** Identify the maximum runoff and design discharge to predict the sizes of reservoirs, drainage systems and flood-protection structures. B.1
- b.2** **Analyze the** Hydrological data, and Muskingum and linear reservoir theory for flood routing, B.2
- c.1** Use the field equipment for measuring the hydrological parameters over the catchment area. C.1
- c.2** Apply the Hydrological Modelling to identify the hydrological process over the catchment area C3
- d.1** **Write** a report on the hydrological studies required for water engineering projects. D1

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V.Course Content:

- Distribution of Semester Weekly Plan Of course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Topics List	Sub Topics List	Week Due	Contact Hours
1	Introduction to hydrology	World's Water Resources Water Resources of Yemen Hydrology and Hydrologic Cycle Forms of Precipitation Scope of Hydrology Hydrological Data Hydrologic Equation	1	2
2	Precipitation	Types of Precipitation Rainfall characteristics Measurement of Precipitation	2	2
3	Runoff	Components of Stream Flow Catchment Characteristics Factors Affecting Runoff Estimation of Runoff Runoff measurement	3,4	4
4	Hydrographs	Hydrograph Components Unit Hydrograph Application of Unit Hydrograph	5	4
5	Hydrological abstraction	Types of losses Evaporation Evapotranspiration Infiltration Water Balance	6	2
6	Analysis of Hydrological data	Applied statics and probability Rainfall analysis Flood frequency analysis Estimates of Missing Data and Adjustment of Records	7	2
7	Midterm Exam		8	2

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8		Applied statics and probability Rainfall analysis Flood frequency analysis Estimates of Missing Data and Adjustment of Records	9	2
9	Stream Gauging	Methods of Measuring Stream Flow Current Meter Gauging Stage-Discharge-Rating Curve	10	4
10	Flood estimation and control	Estimation of Peak Flood Methods of Flood Control Flood Forecasting and Warning	11	2
11	Flood routing	Reservoir Routing Stream Flow Routing	12	2
12	Groundwater	Types of aquifers and formation Darcy's Law	13,14,15	6
13	Final Exam		16	2
Number of Weeks /and Units Per Semester			16	32

VI. Teaching strategies of the course:

The course consists of twelve lectures, and writing assignments including one field visit to the location of Meteorological stations and hydrological measurements. Lectures will be considered as interactive elements and not as a one-way process of transferring knowledge. Feedback from students will be taken into consideration in order that any lecture objectives which has been inadequately covered may be reviewed in the next lecture.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Identify the design discharge to predict the sizes of water structures	a.2,b1, b2,c1	6	2.5
2	Field visit report on the Measurements of the Hydrological parameters in the catchment area.	b1,b2,c1,c2	10	2.5

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VIII. Schedule of Assessment Tasks for Students During the Semester:				
Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Written assignment	6 and 10	5	5
2	Quizzes.	Two time randomly	5	5
3	Mid-term exam.	7 th	20	20
4	Final-exam.	13 th	70	70
	Sum		100	100

IX. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
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2- Essential References.	
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X. Course Policies:	
Unless otherwise stated, the normal course administration policies and rules of the Faculty of ----- apply. For the policy, see: -----	
1	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the faculty.
2	Tardy: The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.
3	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.
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