Course Description Form

1. Course Name:
Hydrology and water resources
2. Course Code:
HYWR452
3. Semester / Year:
First semester – Autumn/ fourth stage / -2023-2024
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
Theory 2 – practical 3 /3.5 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Nabhan Abdulqader Email: umarn79@uomosul.edu.iq Mr. Osama Hasam Fathel
8. Course Objectives

Course Objectives Improve the student's ability in water sciences and hydrology and management of water resources. -increase the student's skills in term of water sciences -improve the student's ability to dealing with different hydrological data and its application in agricultural and soil sciences	Practical Study the hydrological cycle, rainfall, evaporation, infiltration, initial loss, surface run off , ground water , hydrograph , flooding and rain water harvesting

9. Teaching and Learning Strategies	
Strategy Reactive lectures Critical thinking Discussion Require to do Several Homework's and Write scientific report for different task during the semester	Practical: group work and cooperation among students. -learn various academic skills. -Do Homework, discussion in the lab and exercise related to hydrology and water resources

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2 theory	A1: identify The elements of hydrological Cycle A2: explain impact Of climate Change and Human activity On water cycle	Water cycle	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	A14: study of Water Properties C13: distribution Of hydrological; Cycle in 3 different climate Zones.	Water Properties and Flow path of Hydrological Cycle	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
2	2 theory	A3: Mechanism of rainfall formation. A4: Type of precipitation and Rainfall intens	Rainfall Formation	Listening Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	B6: Calculate average rainfall using Thiessen polygon method B7: Calculate average rainfall using isohyetal lines method	Calculate average rainfall over specific area	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
3	2 theory	C1: Draw the relation Between rainfall Depth and area under different Intensity. B1: Design and probability Of maximum Rainfall	Area-depth – Duration of Rainfall	Listening Data show Using white board for Writing and drawing, discussion with students	Quiz, Participation during lecture and Monthly exams

	3 practical	A:15 solve Mathematical Problem isohyetal lines method A16: solve Mathematical Problem Thiessen polygon method	Exercise of Calculated Average Rainfall	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
4	2theory	A5: explain and Determine Of effective Rainfall C2: Analysis the Factors effect on Effective Rainfall	Effective rainfall And factors effect on it	Listening Data show Using white board for Writing and drawing, discussion wi students	Quiz , Participation during lecture and Monthly exams
	3 practical	B8: Analysis Of rainfall Probability B9: apply to determine return Period for rainfall.	Probability And return period	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
5	2theory	A6: Normal and acid rainfall quality C3: interception and depression storage	Rainfall water Quality, interception and initial Loss from Precipitation	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	A17: calculate Frequency of Of rainfall A18:determine rainfall intensity	Draw and Calculate Rainfall Intensity	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
6	2 theory	A7: Evaporation From surface Water body and Soil A8 : listed the Factors effect On evaporation Rate .	Evaporation and factors Effect on it	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams

	3 practical	A9: Calculate Miss rainfall Data B10: Analysis Double mass Cure method	Calculate Miss rainfall Data	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
7	2theory	C4: the relation Between Infiltration And surface Runoff B2: Evaluation The factors Effect of infiltration Into the soil	Infiltration of Water into the Soil	Listening, Data show Using white board for Writing and drawing, discussion wi students	Quiz , Participation during lecture and Monthly exams
	3 practical	B11: using Different Evaporation equations C14: Mathematical Exercise about Evaporation	practical different method to calculate evaporation	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
8	2theory	C5: Watershed Properties Such as drainage Pattern, stream Length and Stream order C6: draw and Determine the Boundary of Watershed	Properties Of watershed	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz, Participation during lecture and Monthly exams
	3 practical	B12: using Infiltration index Equation C15: Mathematical Exercise about Determine Infiltration Index	Determine Infiltration Index	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
	2theory	A9 : describe Surface runoff And it types	Surface runoff	Listening, Data show Using white	Quiz , Participation

9		C7: Analysis the Factors effects On surface runoff		board for Writing and drawing, discussion with students	during lecture and Monthly exams
	3 practical	C16 determine of properties Waters on and calculate Stream order C17: Determine The water Divide and Drainage density And drainage Pattern	Morphometric Analysis For Watershed	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
10	2theory	B6: Study and Evaluation Of hydrograph and It parts. C8: Separate and Analysis hydrograph Parts	Hydrograph	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	C18: Analysis hydrograph Data C19: determine Amount of Discharge and recharge between river and ground water.	Dealing with hydrograph Data	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
11	2theory	A10: explain Porosity and permeability Of rocks and it Related to ground Water A11: Methods Of drilling wells and pumping Test analysis	Ground water And wells	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	B13: plot The locations Of wells and Springs , drawing Water level maps B14: Determine	Determine Ground water Level in wells	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams

		The rate of ground Water flow and estimate The amount of aquifer storage			
12	2theory	C9: reason of flood and factor effect on it. B4: Analysis Of flood data	Flooding and Analysis Of flow Duration Curve	Listening, Data show using white board for Writing and drawing, discussion with students	Quiz, Participation during lecture and Monthly exams
	3 practical	C20: Exercise About flow Duration curve C21: Analysis Discharge data During flood and Drought period	Analysis Of flood data	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
13	2theory	A12: properties and types of Water harvesting A13: advantage and disadvantage Of water Harvesting	water Harvesting	Listening, Data show Using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	B15: Mathematical Exercise about Rainfall water harvesting B16: Mathematical Exercise about Runoff water harvesting	Exercise about Harvesting	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams
14	2theory	C10 : different Type of water Footprint C11 : using Footprint in Agricultural	Water Footprint	Listening, Data show using white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	A21: define Virgin flow A22: Mathematical Exercise about virgin flow	Virgin flow	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams

15	2theory	C12: Interaction Between Surface water and ground Water B5 conserve and good Management Water Resources	Integration Of surface And ground Water Management	Listening, Data showUsing white board for Writing and drawing, discussion with students	Quiz , Participation during lecture and Monthly exams
	3 practical	A23: Field trip to Mosul Dam and Some sites of irrigation Project.	Field trip to Mosul dam	Describe Different Samples, Doing various Lab works exercises	Quiz , Participation during lecture and Monthly exams

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Evaluation method	Deadline	Grade	Relative weight
Final report	At the end of semester	Theory 3 Practical 3	6%
Quiz	Week 4	Theory 2 Practical 2	4%
First exam	Week 6	Theory 10 Practical 5	15%
Second exam	Week 14	Theory 10 Practical 5	15%
Final exam (practical)		20	20%
Final exam (theory)		40	40%
Total		100	100%

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering hydrology author: Basal Alrawi
Main references (sources)	Hydrology in practices (2011)Author Shaw E.M , Beven K.J, Chappell N.A
Recommended books and references (scientific journals, reports...)	Hydrology journal
Electronic References, Websites	USGS website

Dr. Omar Nabhan abdulqader
Theoretical subject lecturer

Mr.Osama Hasam Fathel
Practical subject lecturer

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