

<b>Department of Civil Engineering</b>			
<b>Hydrology (61441)</b>			
<b>Total Credits</b>	<b>3</b>		
<b>major compulsory</b>			
<b>Prerequisites</b>	P1 : Hydraulics (61345)		
<b>Course Contents</b>			
Hydrological cycle, processes, and systems with numerical applications on water budget. Meteorological parameters and concepts related to hydrology. Hydrological measurements include precipitation, evaporation and transpiration, infiltration, interception and depression storage and stream flow. Flood hydrographs and hydrologic flood routing. Rainfall-runoff analysis and modeling. Probability and statistics in hydrology. Introduction to groundwater Hydrology.			
<b>Intended Learning Outcomes (ILO's)</b>		<b>Student Outcomes (SO's)</b>	<b>Contribution</b>
1	1. Ability to perform water balance to a catchment, estimate stream flow and runoff volume	E	15 %
2	2. Ability to fill missing precipitation, estimate areal precipitation, estimate design variables for a given frequency, estimate risks using statistical analyses and develop intensity-duration-frequency relations	A	17 %
3	3. Ability to estimate abstraction from precipitation from a given storm; infiltration, evaporation, depression and interception losses	E	14 %
4	4. Ability to derive unit hydrographs including synthetic unit hydrographs and flood routing	C	48 %
5	5. Ability to estimate total groundwater flowrate and aquifer drawdown under steady state conditions	A	6 %
<b>Textbook and/ or References</b>			
Engineering Hydrology. K Subramanya. Third Edition. McGraw-Hill. 2009. Introduction to Hydrology. W. Viessman and G. L. Lewis. Fifth Edition. Pearson Education, Inc., Upper Saddle River, NJ. 2003. Applied Hydrology. V. T. Chow, D. R. Maidment, and L. W. Mays. McGraw-Hill. 1988. Engineering Hydrology. Principles and Practices. Victor M. Ponce. Prentice Hall. 1989. Rainfall-Runoff Modeling. Keith J. Beven. John Wiley and Sons, LTD. 2001.			
<b>Assessment Criteria</b>		<b>Percent (%)</b>	
First Exam		20 %	
Second Exam		20 %	
Projects		10 %	
Final Exam		50 %	
<b>Course Plan</b>			
<b>Week</b>	<b>Topic</b>		
1	Introduction: hydrologic cycle and water budget.		
2 & 3	Precipitation: measurements of precipitation, raingauge network, presentation of rainfall data, mean precipitation over an area, depth-area-duration relationships, intensity-duration-frequency relationship, probable maximum precipitation, and rainfall dat		
4	Abstraction from Precipitation: evaporation and transpiration, interception and depression storage, and infiltration.		
5	Stream flow Measurements: measurements of stage, measurements of velocity, area-velocity method, tracer-based method, and rating curve.		

5	First mid-term exam
6	Runoff: hydrograph, runoff volume, flow-duration curve, flow mass curve, droughts, and surface water resources in Palestine.
7, 8, 9 & 10	Hydrographs: factors affecting flood hydrograph, components of hydrograph, baseflow separation, effective rainfall, unit hydrograph, synthetic unit hydrograph, and instantaneous unit hydrograph.
10	Second mid-term exam
11 & 12	Floods: rational method, flood frequency analysis, Gumbels method, design flood, design storm, risk and reliability.
13	Flood Routing: basic equations, hydrologic storage routing, hydrologic channel routing, and hydraulic method of flood routing.
14 & 15	Groundwater: introduction, aquifer definition, types and general properties, groundwater flow, steady flow into a well in confined aquifers.
16	Final exam