COLUMBIA UNIVERSITY – THE EARTH INSTITUTE
SCHOOL OF PROFESSIONAL SERVICES – SUSTAINABILITY MANAGEMENT

SPRING 2018

PS5146 – Water Systems Analysis – 3.0 Points - Call Number: 25941

Instructor: Prof. Haralambos V. Vasiliadis, Ph.D., P.E., DEE, D.WRE, CIH
Telephone: 917.488.0507 (preferably Monday thru Friday from 11:00 a.m. to 1:00 p.m. and from 3:00 p.m. to 4:00 p.m.)
Email: hv2202@columbia.edu

Email Specs: Your subject title AND all attached filenames of your emails should have the following format: "PS5146-SP18-<Lastname><FirstName><MiddleInitial>-<subject>", e.g., "PS5146-SP18-VasiliadisHaralambosV-NotesheetA

Office: Room A in Hogan Hall (2910 Broadway
Office hours: By appointment only from 7:15 p.m. to 8:45 p.m. on Wednesdays

Class hours: Tuesdays 6:10 p.m. to 8:00 p.m.
Classroom: 511 Hamilton Hall

Textbook: Karamouz, M. et al, "Water Resources Systems Analysis", Lewis Publishers, 2003, ISBN 978 156 670 6421 Bedient, P. B., W. C. Huber, and B. E. Vieux, "Hydrology and Floodplain Analysis", Pearson Education, Inc., 2013, 5th edition, ISBN-10: 1566706424, ISBN-13: 978-1566706421
References: Cohen, Steven, "Sustainability Manageent", Columbia University Press, 2014, ISBN-10: 0231152590, ISBN-13: 978-0231152594
HV Notes: a. Data – Probabilities – Statistics
b. Engineering Economics
c. Water Resources Engineering
d. Environmental Engineering

Class Descr.: This class provides a structured introduction to the integrated analysis of physical and institutional a) natural water systems (such as lakes, rivers, wetlands, estuaries, etc.), and b) engineered water systems (aka man-made, such as water supply, stormwater and sanitary wastewater collection), for the management and development of water resources and infrastructures by considering, in a holistic manner, all technical and environmental, economic and social, political and cultural aspects. Multiple scales and settings will be considered, ranging from small villages in developing countries to regional watershed management and national planning in the US, in order for students to develop an analytic framework for the integrated (from cradle to grave) management of a water system considering values, supplies and demands. Management is the process of reaching organizational goals by working with and through people and other organization resources. Typically, the 4 basic management functions that make up the management process are: a) planning, b) organizing, c) influencing (awareness/training, incentives/politics, and compliance/enforcement), and d) controlling. In addition to the above, deterministic and stochastic decision-making processes based on multi-objective optimization, simulation and conflict resolution, in conjunction with modeling and design of regulatory systems for water allocation in an environmentally sustainable and engineering resiliency manner will be discussed.

No.	Date	Chapter	Pages	Topic	Homework +/- Project
1	Tuesday 01/16/2018	1		Introduction to water systems analysis	
2	Tuesday 01/23/2018	1		Water budget and allocation Natural and engineered water systems	
3	Tuesday 01/30/2018	1		Hydrology – Hydrologic cycle and water in route	
4	Tuesday 02/06/2018	1 and 7		Hydrology – Surface and Groundwater	
5	Tuesday 02/13/2018	HV Notes C and D		Natural systems – rivers, lakes, oceans, wetland, estuaries, etc.	
6	Tuesday 02/20/2018	10, 11, 12 and HV Notes C		Engineered systems – water storage (reservoirs and tanks) and distribution, water supply and treatment, stormwater management, wastewater collection and treatment	
7	Tuesday 02/27/2018	6, 8, 9		Modeling in water resources	
8	Tuesday 03/06/2018	5 and HV Notes A		Analysis of uncertainty	

				Data – Probabilities - statistics	
--	Tuesday 03/13/2018	Spring Recess – No Classes [03/12 - 03/16]			
9	Tuesday 03/20/2018	**Mid-Term Exam – Chapters**			
10	Tuesday 03/27/2018	5 and HV Notes A		Risk analysis and management	
11	Tuesday 04/03/2018	2 and 3		Decision making Optimization and conflict resolution	
12	Tuesday 04/10/2018	HV Notes D		Sustainability, resiliency and adaptation	
13	Tuesday 04/17/2018	HV Notes D		Legislation, Agencies and Organizations	
14	Tuesday 04/24/2018	4 and HV Notes B		Policy, environment and water stressors – economic, health/hygiene, safety, environmental, cultural political, etc.	
--	Tuesday 05/01/2018	Study Days [05/01 - 05/03]			
15	Tuesday 05/08/2018	**Final Exam [05/04 – 05/11] – Chapters**			

Grading Policy:

Exams -	Midterm:	30%
	Final:	30%
Project -	Report:	20%
	Presentation:	10%
Homework:		10%
Bonuses:		4% for each set of exam notes

Exams: There will be two (2) exams (one midterm and one final exam). Exams will be based on lecture material, homework assignments and projects. Specific topics for each exam will be announced in class in advance. The examinations may consist of short-answer questions, true/false questions, numerical problems and essay questions. All exams will be closed book and notes. You may bring with you 2 sheets (8.5"x11") of notes (i.e., 4 pages) for the midterm exam and 4 sheets (i.e., 8 pages) for the final exam but you are **not** allowed to include any numerical examples. In addition, you may bring copies of tables and conversions (maximum 2 pages for each exam). Your exam notes will be reviewed in the beginning of each exam. Each set of exam sheets may receive up to 3 bonus points for its completeness, integrity and presentation. Typed exam notes will receive one (1) extra bonus point. During the exams, you are allowed to use calculators, rulers, pens/pencils and erasers. However, you are **not** allowed to use cell phones, computers (including notebooks, netbooks, ipads, etc.) or other electronic devices.

Reports: Use only 8½ "x11" paper. No cover pages. Staple all pages at the top left corner. On the top right corner of the first page of your assignments include your full name, homework assignment, problems solved partially and problems solved completely along with the date of submission. The overall appearance of your submittals is very important. You may use either international (SI) or English (EU) units.

Class review: N/A

Assignments: N/A

Project: TBA

School Policies and Expectations:

1. Academic Integrity – Full compliance with the Code of Academic and Professional Conduct is required. Any violations will be reported to the Associate Dean for Students Affairs. The Code of Academic and Professional Conduct can be viewed online: http://sps.columbia.edu/student-life-and-alumni-relations/academic-integrity-and-community-standards
2. Accessibility Statement – Columbia Unoiersity os committed to providing equal access to qualified students with documented disabilities. For more information regarding this service, please visit the University's Health Services website: http://health.columbia.edu/disability-services