Environmental Engineering Laboratory

UNIVERSITY OF CONNECTICUT
DEPT. OF CIVIL & ENVIRONMENTAL ENGINEERING

ENVE 3200
SPRING 2017

Lecture: ***Tuesday 11:00-12:50 (CAST 201)*** **Lab:** ***Thursday 11-2, 2-5 (CAST 114/112)***

Instructors: Labs 0-5: **Prof. Alexander G. Agrios**, CAST 310, 486-1350, agrios@uconn.edu

Lab 6 onward: **Prof. Baikun Li**, CAST 312, 486-2339, baikun.li@uconn.edu

Office Hours: Wed 11:00 am – 1:00 pm, CAST 310 (Prof. Agrios)

Teaching Assistants:

Kevin (Yaguang) Du, yaguang.du@uconn.edu, TA

Undegraduate assistants: Stephanie Hubli (11-2), Danny Ross (2-5)

Course Texts

Mandatory

1. Laboratory Notebook – any version at the UConn Bookstore that includes carbon copy pages. Instructions for each lab will be provided on HuskyCT.

Supplementary Texts (Available at Babbidge Library)

1. Sawyer, C.N., P.L. McCarty, G.F. Parkin (2003) Chemistry for Environmental Engineering and Science. 5th Edition, McGraw-Hill, 752 pp.
2. Robinson, M.S., Stoller, F.L., Costanza-Robinson, M.S., Jones, J.K. (2008) Write Like a Chemist. Oxford, New York.
3. Skoog, D. A.; West, D. M.; Holler, F. J. Fundamentals of Analytical Chemistry; 7 ed.; Saunders College Publishing: New York, NY, 1996, pp 870.
4. Reynolds, T. D.; Richards, P. A. Unit Operations and Processes in Environmental Engineering; 2 ed.; PWS Publishing Co.: Boston, MA, 1996, pp 798.
5. Jenkins, D.; Snoeyink, V. L.; Ferguson, J. F.; Leckie, J. O. Water Chemistry, Laboratory Manual; 3 ed.; John Wiley & Sons: New York, NY, 1980.
6. Snoeyink, V. L.; Jenkins, D. Water Chemistry; 1 ed.; John Wiley & Sons: New York, NY, 1980, pp 463.
7. Droste, R. L. Theory and Practice of Water and Wastewater Treatment; John Wiley & Sons, Inc.: New York, NY, 1997, pp 800.

8. American Water Works Association. Water Quality and Treatment; 4 ed.; Mc-Graw-Hill, Inc.: New York, NY, 1999, pp 1194.
9. Standard Methods for the Examination of Water and Wastewater; 19 ed.; Eaton, A. D.; Clesceri, L. S.; Greenberg, A. E., Ed.; American Public Health Association: Washington, DC, 1995.
10. Huckin, T. N. and L. A. Olsen. 1991. Technical writing and professional communication. McGraw-Hill, Inc., New York, NY.
11. Kanare, H.M. (1985) Writing the Laboratory Notebook. American Chemical Society, Washington, D.C. *especially Ch. 5 & 6*.

Grading:

Formal Lab Reports: Individual (2)	20%
Informal Lab Reports: Individual (7)	50%
Final Project: Group (Report/Presentation)	15/5%
Pre-lab and Quizzes	10%

Lab Reports are due at the BEGINNING of lab session

No late assignments accepted!!!

Lab Notebooks: The laboratory notebook is an essential document for any experimental work, used to record ideas, plans, methodology/procedure in addition to data. Notes should be clear, concise, and ***neatly recorded*** (see Kanare (1985), *Writing the Laboratory Notebook* (ACS), as a guide). A significant part of the laboratory write-up should occur ***before*** **the lab period** – including the title, purpose, materials and methods (see *Report Guide* handout). Your name must be on every page of your notebook.

Lab Reports: The report-writing efforts will involve a buildup to complete formal laboratory reports. We will begin with informal reports focusing on individual sections and ultimately get to the synthesis of a complete report by combining these individual sections into a well-written, flowing report with all sections linked together smoothly. Long formal laboratory reports are required for select experiments, including the Final Project. All reports are due at the beginning of the laboratory period one week after the completion of the laboratory experiment as specified in the table below. The formal lab report should cover: Introduction (Relevant Theory with Objectives stated), Methodology, Results, Discussion, References, Tables/Figures and necessary Appendices as described in more detail in the *Report Guide* handout. Reports will be graded on both technical content and editorial quality.

Long formal lab reports should be concise and well written (10-15 pages, double-spaced, font size = 12). ***Tables and figures should be placed within the report and referenced as e.g. (Table 1)***. Two labs, *BOD*

and Chlorination, will be formal reports. In addition, the project will be a team written formal lab report with shared writing responsibility.

The remaining laboratory reports will be informal reports. Informal reports will emphasize one aspect of formal report writing: One section of the informal report specified by the instructor will be composed as required for a formal report, whereas other sections can be completed in bullet form. A FULL data analysis and presentation must be performed for all reports! A portion of the informal lab report grade will be assigned for high-quality data presentation and overall report organization.

Overall Course Objectives

At the completion of this course you will be able to:

1. Apply fundamental and quantitative knowledge about environmental chemistry to interpret and solve water, soil and air quality engineering problems.
2. Apply basic statistical techniques to analyze and interpret experimental data.
3. Design, conduct, analyze and interpret lab- and pilot-scale experiments to estimate kinetic and stoichiometric information for water quality engineering unit processes.
4. Summarize, interpret, and present experimental information in formal reports and via oral presentations.
5. Critique technical writing and provide feedback to others.
6. Work effectively as a team member and team leader to solve water quality engineering tasks.

Spring 2016 ENVE 3200 Course Calendar

LECTURE	TOPIC	READING: *SAWYER* (Chapter or sections unless noted)	READING: *ROBINSON* (Chapters or sections unless noted)	LAB	READING: *LAB MANUAL*	LABORATORY EXPERIMENT	DUE
Jan 17	Introduction, Overview; Review Report: *Data Presentation*	**1, 9, 10**	1, **16**	**Jan 19**	**Lab 0**	Excel Stats lab in CAST117 11-2 pm (group 1) 2-5 pm (group 2) (Lab 0)	Pre-lab 0
Jan 24	Data Analysis; Review Report: *Overview; Language*	1, **2**, 9, **10, 11.2, 11.3;11.4**	**2, p. 583, pp. 601-658**	**Jan 26**	**Lab 1**	Lab familiarization/Safety Gravimetric Data lab (Lab 1)	Lab 0 (excel template), Pre-lab 1
Jan 31	Water Quality Parameters Report: *Methods*	**13**, **26**, **34**	**3**	**Feb 2**	**Lab 2**	Total/Dissolved Solids (Lab 2)	Lab 1 (informal), Pre-lab 2
Feb 7	Alkalinity; titration; Coagulation/flocc'n Report: *Results*	4,**12.3, 16, 18, 15.1, 7**	**4**	**Feb 9**	**Lab 3 OR Lab 4**	Alkalinity/Titration (Lab 3) OR Coagulation and Flocculation (Lab 4)	Lab 2 (informal) +*Methods*, Pre-lab 3/4
Feb 14	Adsorption Isotherms Spectrophotometry Report: *Discussion*	**3.12, 12.2 pp.294-296**	**5**	**Feb 16**	**Lab 3 OR Lab 4**	Alkalinity/Titration (Lab 3) OR Coagulation and Flocculation (Lab 4)	

Feb 21	Adsorption: Set-Up (Lab 5) **In 114** (Pre-lab 5 due)	**Lab 5**		**Feb 23**	**Lab 5**	Adsorption (Lab 5)	Lab 3/Lab 4 (informal) +*Results & Discussion*
Feb 28	Biological Treatment; Project Hypothesis Report: *Introduction*	**23**, 22	**18**	**Mar 2**	**Lab 6**	BOD (Lab 6)	Lab 5 (informal) +*Introduction*, Pre-lab 6
Mar 7	Finish BOD Lab (in 114);	**p.25-26, 3.8, 5.34,12.4, 33.4**	**6**	**Mar 9**			Lab 6 (formal)

SPRING BREAK MARCH 12-18

Mar 21	Lab 6 Critique PROJECT DESIGN			**Mar 23**		PROJECT DESIGN	
Mar 28	Chlorination	**2.7**, **3.10**, **4.8**, **20**		**Mar 30**	**Lab 7**	Chlorination (Lab 7)	Pre-lab 7

Apr 4	FINAL PROJECT: Experiment			**Apr 6**		FINAL PROJECT: Experiment	Lab 7 (formal)
Apr 11	*Presentation: Know Your Audience* FINAL PROJECT: Experiment		**pp. 584-600**	**Apr 13**		FINAL PROJECT: Experiment	
Apr 18	FINAL PROJECT: Experiment			**Apr 20**		**PROJECT PRESENTATIONS** **Location TBD**	
Apr 25	Air Pollution/ Atmos. Nitrogen	**25.2**	**7**	**Apr 27**	**Lab 8**	NO_x in Car Exhaust (Lab 8)	Lab 8 (informal)
May 2				**May 4**		**FINAL PROJECT REPORTS**	Project Reports (group formal) +abstract