

EES 5245
Water Quality Analysis

Spring Semester 2006
Periods 5 & 6 [11:45 am-1:40 pm] M; Period 5 W
Classroom 415 AP Black Hall
E-mail: delfino@ufl.edu; Tel. 392-9377

Professor J. J. Delfino
Ofce Rm 310 AP Black Hall
Ofce Hrs: By appointment; before
or after M class or "Drop-in"

Course Information

Description: Principles of analytical chemistry and their applications to the determination of chemical composition of natural waters and wastewater. Emphasis on methods used in routine determinations of water and wastewater quality and interpretation of data. Prereqs: CHM 2046, EES 4201 or 6208, or consent of instructor. 3 Credits.

Required Text: Chemistry for Environmental Engineers, 5th Ed., by C. Sawyer, P. McCarty and G. Parkin. McGraw Hill, 2003.

Topics and Assignments: Daily class topics and assignment schedules are provided separately. Students are expected to read the text assignments, complete the homework assignments [not formally graded] and review previous examinations [available separately] in preparation for course examinations. # Reading and homework problem assignments are from the course text by Sawyer, McCarty and Parkin [5th Ed.].

Recommendation - take notes in class to supplement the text material and PowerPoint slides, as needed. Discussion and lecture material presented in class often goes beyond the information provided in the text readings and PowerPoint slides.

Course Goals: Students are given the opportunity to learn:

- (1) the physical, chemical and biological parameters that must be determined to make informed judgments about water quality;
- (2) the legal and regulatory framework that governs water quality analyses;
- (3) the chemistry of analytical methods and the theory and practice of the instrumentation employed in water quality analyses;
- (4) the environmental significance of water quality data;
- (5) the terminology, jargon and acronyms that are commonly employed in water quality;
- (6) current water quality issues interpreted in the context of the course material.

Course Scheduling: Class will generally meet as scheduled. On occasion, a class session may need to be rescheduled, a guest speaker invited, or out of class assignments given in lieu of a regular class meeting. Notice of schedule changes will be provided, in advance.

Grading: (1) **Examinations** [3@ 90% of total course grade; dates are provided below]. (2) **Homework, Lab Activity and Class Interaction** @ 10% of the total course grade. The final course letter grade will be based on the total numerical grade earned. Typically, an A requires $\geq 90/100$, B $\geq 80/100$, etc.

Academic honesty: all students are expected to exhibit academic honesty and abide by the University's Honor Code. All examinations, reports, and papers must represent a student's own individual work. Plagiarism in writing assignments is not acceptable and violated the Honor Code.

Students with disabilities: students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide documentation to the student who must then provide such information to the Course Instructor when requesting accommodation. There are many resources available on campus to assist students who have special needs. Office locations, phone numbers, web site URLs, etc. are available through the UF Dean of Students Office at 392-1261 or <http://www.dso.ufl.edu/campuscounseling.html>

Religious observations: requests for exceptions to scheduled course activities based on a student's legitimate religious observation should be made in advance to the course instructor so that alternate arrangements can be made.

Examinations are administered during a regularly scheduled class period and are to be taken on the scheduled dates [see separate class schedule and also listed below]. Requests for exceptions must be based on unusual circumstances and will be considered on a case by case basis.

General: Students are encouraged to ask questions at any time before, during or following class periods, and/or in the course instructor's office to request clarification or explanation. Your goal should be to learn the course material and to take advantage of every opportunity to do so.

Dates of Examinations [during regularly scheduled class period]:

Examination No. 1	Wednesday, February 8, 2006
Examination No. 2	Wednesday, March 8, 2006
Examination No. 3	Wednesday, April 26, 2006

Class Meeting	Day	2006 Date	Topic [#]
1	M	Jan 9	Introduction
		Read Ch. 1, pp. 3 – 9	
2	M	Jan 9	Florida Water Story [Videos]
3	W	Jan 11	Environmental Laws & Regulations
		Visit USEPA Web Site www.epa.gov	
		Read information on laws: SDWA, CWA, RCRA, CERCLA	
		Read pp. 713 – 718; 723 – 724	
		Answer Problems 34.2, 34.3, 34.4, 34.6	
	M	Jan 16	M. L. King Observance – <u>No Class</u>

4	W	Jan 18	Environ. Laws & Regs – Cont'd
5	M	Jan 23	Environ. Laws & Regs - Concluded Quality Assurance & Quality Control Read Ch. 2(review as needed for updating general chemistry concepts); Answer Problems 2.1, 2.2, 2.3, 2.7 (a, c-d) Read Ch. 9, pp. 401 – 408; Ch. 10 (review as needed) Answer Problems 9.1, 10.7, 10.8, 10.9 Read Ch. 11, pp. 452 – 466
6	M	Jan 23	QA & QC: Gen. Water Qual Indicators [Standard solutions, pH, acidity, alkalinity, conductivity, DO, turbidity, solids, hardness, anions and cations] [Note: these readings and problems pertain to classes 6 – 11] Read Ch. 15, Ch. 16, Ch. 17, Ch. 18, Ch. 19, pp. 77- 80, Ch. 13, Ch. 21, Ch. 22, Ch. 26, Ch. 28, Ch. 29. Answer Problems 15.1, 15.3, 15.7, 16.1, 16.3, 16.6, 2.30, 4.19(a), 17.7, 17.8, 18.10, 18.14, 13.2, 13.3, 13.4, 26.12, 26.13, 19.8, 2.5, 2.43, 2.44, 2.47, 22.2, 22.3, 22.4, 22.7, 22.8
7	W	Jan 25	QA & QC General Water Qual. Indicators
8	M	Jan 30	General Water Qual. Indicators – Cont'd
9	M	Jan 30	General Water Qual. Indicators – Cont'd
10	W	Feb 1	General Water Qual. Indicators – Cont'd
11	M	Feb 6	General Water Qual. Indicators – Cont'd and Concluded; Review HW Problems
12	M	Feb 6	Review for Examination #1 Review [in advance] appropriate copies of <i>Previous WQA Examinations</i> [provided separately]
13	W	Feb 8	Examination # 1

<u>Class Meeting</u>	<u>Day</u>	<u>Date [2006]</u>	<u>Topic#</u>
14 - 15	M	Feb 13	Laboratory – pH, Alkalinity, Calcium and Dissolved Oxygen
16	W	Feb 15	Water Quality Criteria and Standards DEP site at www.dep.state.fl.us/ then click on “water”, “surface water,” and links to 62-302 and 62-302.530
17 - 18	M	Feb 20	Risk Assessment Class Notes Molecular Spectroscopy Read pp. 466 - 473 Answer Problems 11.25, 11.26, 11.27, 11.28
19	W	Feb 22	Eutrophication Class Notes and Slides
20 - 21	M	Feb 27	Phosphorus Read Ch. 30, pp. 677 - 681 Answer Problems 2.53, 30.4, 30.5, 30.6, 30.8 Nitrogen Read Ch. 25, pp. 631 - 647 Answer Problems 2.46, 3.11(b), 4.9, 25.1, 25.2, 25.3, 25.4, 25.6, 25.10, 25.19
22	W	Mar 1	Color; Natural Organic Matter Read Ch. 14, pp. 523 - 527 Answer Problems 11.24, 14.1, 14.2, 14.3, 14.4, 14.5
23 - 24	M	Review for Examination # 2	
25	W	Mar 8	Examination # 2
	M - F	Mar 13 – 17	Spring Break – <u>No Class</u>

<u>Class Meeting</u>	<u>Day</u>	<u>Date [2006]</u>	<u>Topic#</u>
26 – 27	M	Mar 20	Laboratory – Phosphorus
28	W	Mar 22	Oxygen Demand: BOD Read Ch. 23, pp. 604 - 622 Answer Problems 3.37, 23.1, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 23.14, 23.18, 23.22

29 – 30	M	Mar 27	Oxygen Demand: BOD, COD, TOC Read Ch. 24, pp. 625 - 630 Answer Problems 11.16, 24.1, 24.2, 24.7, 24.12, 24.13
31	W	Mar 29	Trace Metals Read pp. 659-664, 717-724, 726-727 Answer 27.2, 27.3, 27.4, 27.5, 34.10, 34.11, 34.12
32 – 33	M	Apr 3	Atomic Spectroscopy Read pp. 481-487 Answer 12.1, 12.3, 12.8, 12.12, 12.14, 12.15, 34.13
34	W	Apr 5	Microbiology, Disinfection Read pp. 519-520, 571-585, 712, 715 Answer 20.1, 20.2, 20.3, 20.4, 20.11, 20.15, 34.7
35 – 36	M	Apr 10	Organic Contaminants Read pp. 238-242, 246-254, 279-307, 709-712, 714-718 Answer 5.26(a,c,e,f), 5.27(b,c,f,h,i), 5.31, 5.35, 5.39, 34.8, 34.9, 34.13 Organic Sample Preparation Read pp. 724-726 Answer 12.32, 34.15
37	W	Apr 12	Chromatography - Introduction Read pp. 503-512 Answer 12.23
38 – 39	M	Apr 17	Chromatography – GC, HPLC, GCMS Read pp. 504-514 Answer 12.24, 12.25, 12.26, 12.27, 12.28, 12.29, 12.30, 12.33, 12.34, 34.16
40	W	Apr 19	Water Quality Indices Read Class Notes
41 – 42	M	Apr 24	Course Evaluation, Course Summary HW and Examination # 3 Review
43	W	Apr 26	Examination # 3