FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—NEW COURSE PROPOSAL[1]

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
CATALOG _____

DEPARTMENT: Civil, Environmental and Geomatics Engineering

COLLEGE: ENGINEERING AND COMPUTER SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX **ENV** COURSE NUMBER 5514 LAB CODE (C) N/A

(TO OBTAIN A COURSE NUMBER, CONTACT

COMPLETE COURSE TITLE: Water and Wastewater Treatment

EFFECTIVE DATE
(first term course will be offered)

SUMMER 2016

CREDITS[2]:
3

TEXTBOOK INFORMATION:

Hammer and Hammer (2011), 7th Edition, Water and Wastewater Treatment Systems, Prentice Hall

GRADING *(SELECT ONLY ONE GRADING OPTION)*: REGULAR YES SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN THREE LINES:

This is a graduate level course that introduces students to the principles and design of physical, chemical and biological, and physical treatment systems for potable and wastewater applications. The class meets twice per week W 7:10-10 p.m. p.m. A real example will be used as the backdrop for homework/project exercises.

PREREQUISITES *:	COREQUISITES*:	REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)*:
Graduate status, ENV 5002 or equivalent	NONE	MAJOR ENVIRONMENTAL ENGINEERING

** PREREQUISITES, CO-REQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.*

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:

Faculty contact, email and complete phone number:

Dr. Frederick Bloetscher, P.E., DWRE, LEED-AP, Associate Professor

Office Address:
Engineering West (EG-36) Bldg., Room 219

Telephone Number: 239-250-2423

Email Address: h2o_man@bellsouth.net

Please consult and list departments that might be affected by the new course and attach comments.[3]

This is a graduate level companion to ENV 4514 for BS/MS students in Environmental engineering, and does not affect any other department

Approved by:	*Date:*	
Department Chair:	02/10/2016	1. **Syllabus** must be attached; see guidelines for requirements: *www.fau.edu/provost/files/course_syllabus.2011.pdf*
College Curriculum Chair:	2/25/16	
College Dean:	2/25/2016	2. Review **Provost Memorandum: Definition of a Credit Hour** *www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf*
UGPC Chair:		
Graduate College Dean:		
UFS President:		3. **Consent** from affected departments (attach if necessary)
Provost:		

Email this form and syllabus to *UGPC@fau.edu* **one week before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

Florida Atlantic University

Department of Civil Engineering

ENV 5514 Water and Wastewater Treatment

Fall 2016

1. Course title/number, number of credit hours	
Water and Wastewater Treatment (ENV 5514)	3 credit hours

2. Course prerequisites, co-requisites, and where the course fits in the program of study

Prerequisite: ENV 5002 and CWR 3201 (Applied Hydraulics) or equivalent, *senior standing or graduate status and instructor approval.*
Co-Requisites: None.

This is a senior level course in which principles and design of physical, chemical and biological, and physical treatment systems for potable and wastewater applications for civil engineering projects are covered.

3. Course logistics

Term: Fall 2016
This is a classroom lecture course
Class location and time: T. 7:10 pm – 10:00 pm

4. Instructor contact information

Instructor's name	Dr. Frederick Bloetscher, PE, Associate Professor		
Office address	Engineering West (EG-36) Room 219		
Office hours			
Telephone no.	239-250-2423		
Email address	h2o_man@bellsouth.net		

5. TA contact information

Not applicable

6. Course description

Principles and design of physical, chemical and biological, and physical treatment systems for potable and wastewater applications. The class meets twice per week W 7:10-10 p.m. p.m. A real example will be used as the backdrop for homework/project exercises.

TOPICS	1. Review Chemical and Biological Basics 2. Basics of Water/Wastewater Quality 3. Regulations 4. Application of Piping and Pumping 5. Treatment Plant schematics/Process Flow diagramming 6. Process selection 7. Chemical treatment methods (alum flocculation, lime softening) 8. Disinfection 9. Physical Treatment methods (settling, mixing) 10. Filtration and membranes 11. Biological Treatment 12. Effluent Disposal

7. Course objectives/student learning outcomes/program outcomes

COURSE OBJECTIVES	I. Present the fundamental principles applied in the analysis, design, modeling, and operation of engineered water and wastewater treatment systems.

	II. Evaluate the general characteristics of water and wastewater needed for engineering design of treatment systems. III. Develop schematics for water and wastewater treatment systems governed by physical, chemical and biological processes to remove certain water characteristics and meet design goals IV. Understand professional practice issues such as procurement of work; how design professionals and the construction professions interact to construct a project V. Expose students to the complex interaction between water and wastewater problems and the needs of society.	
COURSE OUTCOMES & RELATIONSHIP TO ABET A –K OUTCOMES	A. Ability to understand the basic principles applied to the water treatment systems and the ability to calculate the major components of same B. Ability to understand the fundamental principles necessary to conceptualize engineered water treatment systems (a, b, c, e, f, h, k) C. The ability to communicate effectively about issues in water and wastewater engineering (e, f, h, j, k) D. Ability to perform entry level design of water and wastewater unit processes (d, e, f, g, i)	
CONTRIBUTION TO PROGRAM CURRICULUM **RELATIONSHIP TO PROGRAM OUTCOMES**	**Outcome 1**: An understanding of professional and ethical responsibility.	M
	Outcome 2: A working knowledge of fundamentals, engineering tools, and experimental methodologies.	H
	Outcome 3: An understanding of the social, economic, and political contexts in which engineers must function.	H
	Outcome 4: An ability to plan and execute an engineering design to meet an identified need.	H
	Outcome 5: An ability to function on multi-disciplinary teams.	M
	Outcome 6: An ability to communicate effectively.	H
	Outcome 7: Graduates will have a proficiency in the following areas of civil engineering: (a) structural engineering, (b) transportation engineering, (c) geotechnical engineering, and (d) water resources/environmental engineering.	H
	Outcome 8: Graduates will have an appreciation for the role of civil engineering in infrastructure planning and sustainability, including hazard mitigation.	M
	Outcome 9: Graduates will be successful in finding professional employment and/or pursuing further academic studies.	M

8. Course evaluation method (note percentages subject to change)

Mid Term Exams	40%	*Note*: The minimum grade required to pass the course is C.
Final Exam	20%	
Project	35%	
Homework	5%	

9. Course grading scale

Course grades are assigned according to the attached Department of Civil Engineering Grading Guidelines. Assignments and reports must be prepared according to the required formats (see attached documents: (a) Assignment Presentation and (b) Technical/Project/Laboratory Report Writing). Additional requirements may be given by the instructor. **NOTE: you cannot pass the class if you fail all 3 exams regardless of you grade.**

D- Insufficient achievement of stated outcomes. Student is not capable of practice in this area of civil engineering. Course must be repeated and student may not enroll, under any circumstances, for a subsequent course requiring this course as a prerequisite.

10. Policy on makeup tests, late work, and incompletes

Exams will be given only at the scheduled times and places. No one is exempt from the final examination.
Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exams will be administered and proctored by department personnel unless there are other pre-approved arrangements.
Late work is not acceptable.
Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation, incomplete grades will not be given.
Attendance to class is required. You are expected to attend and participate in all class sessions. Final grades will be reduced by one letter for every three (3) unexcused absences (as determined by the instructor).

11. Special course requirements

none.

12. Classroom etiquette policy

1. Cell phones and beepers should have the ringers turned off as a courtesy to the instructor and your fellow classmates.
2. Exams will be given only at the scheduled times and places. No make-ups, except in documented emergencies. No one is exempt from the final examination.
3. Attendance to class is required. You are expected to attend and participate in all class sessions. Final grades will be reduced by one letter for every three (3) unexcused absences (as determined by the instructor). Attendance to at least one (1) professional meeting is required.
4. You are expected to complete the assigned reading prior to the date indicated on the class schedule, to do all homework assignments, and to participate fully in the group projects.
5. Assignments are due at the beginning of class on the date indicated on the assignment sheet. Late assignments are not accepted. Assignments turned in early will receive extra credit.
6. Tests are CLOSED BOOK ONLY
7. University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS)—in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 110 (561-799-8585) —and follow all SAS procedures.

14. Honor code policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf.

15. Required texts/reading

1. Hammer and Hammer (2011), 7th Edition, Water and Wastewater Treatment Systems, Prentice Hall (required)

16. Supplementary/recommended readings

1. **none**

17. Other

1. College of Engineering and Computer Science (COECS) Technology Services Group (TSG)

   TSG provides support for students with issues related to the use of College computing resources such as lamp.cse.fau.edu, the student web server, and GENIE, the Citrix Remote Application Server. TSG also supports the Microsoft Developer Network Academic Alliance portal through which students taking courses in CEECS can obtain free copies of many software products from Microsoft. Details of these and other resources are described on the TSG web site at tsg.eng.fau.edu.

   For support issues not covered on the web site students must send email to help@eng.fau.edu. TSG responds to help requests only through this email address. Do not attempt to phone them or contact them personally. TSG support is limited to assistance with COECS computing resources such as having your password on lamp reset. They do not handle specific course related questions. Those should be directed to the instructor for the course.
2. FAU Information Resource Management (IRM)

   RM provides support for general computing and network issues at FAU. General information and many resources can be found on the IRM site, www.fau.edu/irm/index.php. IRM provides direct student through an online Help Desk at www.fau.edu/helpdesk/. The help desk includes extensive online support resources and a "Ticket" submission system for support requests. Areas of particular concern to students in this course covered by the Help Desk include general Blackboard, FAU NetId and network login, and FAU Google Email. The Help Desk can also be accessed by phone at (561) 297-3999. Phone access should generally be used only if you are unable to log in to FAU systems. For most other issues the phone consultant will simply record your concern and submit a help ticket on your behalf. The help ticket will get the same treatment as one you submit directly.

3. College of Engineering and Computer Science (COECS) Division of Engineering Student Services (ESS)

ESS provides general advising and academic support for students in COECS including free tutoring support for all students in computer science courses. Additional information can be found on their web page at www.eng.fau.edu/engineering-student-services.

4. FAU University Center for Excellence in Writing (UCEW)

   The UCEW, sometimes referred to simply as the Writing Center, provides assistance to students with writing assignments through consultants. They can assess student writing skills and suggest approaches to dealing with problem areas. The center web site is at www.fau.edu/UCEW/WC.

Florida Atlantic University

Department of Civil Engineering

ENV 5514 Water and Wastewater Treatment

Fall 2016

18. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Date:	Topic	Reading
Week 1	Introduction Sources of Water Sustainability	Chapter 1
Week 2	Regulations Biological Contaminants Chemical Contaminants	Chapter 3, 5
Week 3	Surface vs Groundwater Groundwater and Wells Water Demands	Chapter 6
Week 4	Water Plant Solutions Water Quality - Basics of Water Chemistry Chemical Processes	Ch 2 & 7
Week 5	Water Plant Solutions Water Quality - Basics of Water Chemistry Lime Softening Processes	Ch 2 & 7
SAT	**Field Trip**	
Week 6	Review **Project Discussion**	Ch 2 & 7
Week 7	**Midterm Exam 1**	Chapter 7
Week 8	Physical Processes	
Week 9	Presentation 1	Chapter 7&11
Week 10	Biological Processes and Sludge	Chapter 11 -14
Week 11	Alternative Treatment Options	Various
Week 12	**Midterm Exam 2**	
Week 13	Disposal Methods (most this is not in the book)	
Week 14	**Group Presentation Project** Review	
Week 15	No Class DAC Meeting	
Week 16	**Final Exam**	

HW#5 ENV-5514 Water and Wastewater Teatment

Problem #3.24 (Doe, J.R. "Fundamentals of Environmental Engineering", 1999)

GIVEN: Min value of Oxygen Sag = 3.0 mg/L
Naturally Occurring DO in the stream = 10 mg/L
Min allowable DO = 5.0 mg/L
Reaeration coefficient = 0.80/day
Deoxygenation Coefficient = 0.20/day
Stream velocity = 60 miles/day

FIND: (a) Percentage of BOD that must be treated to ensure healthy environmental conditions
(b) How far downstream in miles the lowest DO would occur?

SOLUTION:

a) The minimum DO of 3.0 mg/L means that the maximum deficit (before fixing it) is

$DO_{max} = 10 - 3 = 7$ mg/L

For healthy conditions, the DO_{min} should be 5 mg/L so that the new DO_{max} should be

$DO_{max(new)} = 10 - 5 = 5$ mg/L

Then $DO_{max} / DO_{max(new)} = 5.0/7.0 = 0.71$

ANSWER: Thus, 29% of the BOD needs to be removed. Since a primary treatment plant removes about 35% of the BOD (Chapter 3, pp 76) then **it would be enough**.

b) Using Eq. (5.34) the critical time and distance downstream are given as:

Critical time: $t_c = \ln(k_r/k_d)/(k_r - k_d) = \ln(0.8/0.2)/(0.8 - 0.2) = 2.31$ days

Distance: L = 60 mi/day x 2.31 days = 138.6 miles

ANSWER: Critical time is **2.31 days**; Distance is **138.6 miles**

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Assignment Presentation
(Required Format)

All assignments (i.e., homework, projects, etc) to be completed by students attending courses offered by the Civil Engineering Department must be presented in a standardized format.

Any assignments that do not comply with the following guidelines will not be accepted.

1. The assignment must be written in an 8.5 x 11 inches engineering or white paper. The problem narrative must not be repeated in the assignment sheet. However, the problem number from the textbook must be given as well as the GIVEN data and the FIND (whatever the problem is asking for) must be listed briefly. If homework is a handout, attach the handout at the front of the homework.

2. Each page must have:

   (a) Course Number and Name (e.g., ENV-5514 Environmental Engineering and Science) at the top center,
   (b) Assignment Number (e.g. HW#5) at the top left,
   (c) Student's Name (e.g., J.M. Dover) at the top right, and
   (d) Page Number and Total Number of Pages (e.g. 2/3) at the bottom center.

3. The text and computations in the assignment must be written in a professional manner, i.e.:
   (a) Any derivations of formulas/equations, symbols, etc must be properly explained,
   (b) Any assumptions/simplifications made must be mentioned and justified,
   (c) The solution must be written in reasonable sequence,
   (d) The final result(s) must be given at the end of the problem written within a box,
   (e) Half way "solutions" are not acceptable,
   (f) Just mentioning the solution algorithm/process of the problem is not acceptable; all of the computations must be carried to the very end, and
   (g) Any unsuccessful initial attempts of solving the problem must be kept out of the assignment submitted.

4. The assignments must be presented also in a legible and well-written manner. The handwriting must be neat otherwise the assignment must be typed.

5. The assignment sheets must not be creased or folded but be stapled together at the upper left corner.

An example of an acceptable HW assignment is attached.

Technical/Project Report Writing

(Required Format)

ABSTRACT/EXECUTIVE SUMMARY

Brief but concise description of the project objectives, methodologies, results and conclusions.

TABLE OF CONTENTS

Including List of Figures and List of Tables.

INTRODUCTION/Background

Background information; Description of the existing state-of-the-art; Objectives and goals of the present project; anticipated results.

DESIGN NEEDS/ANALYSIS OF ALTERNATIVES

Detailed description of the (a) current deficiencies (b) Design goals (c) options to achieve design needs (d)materials utilized (e.g., chemicals, type of soils, type of liquids, etc), (e) comparison of alternatives, and (f) summary of alternatives and matrix. Recommend and alternative and why.

DESIGN OF SELECTED OPTION

Data collection, compilation, and analysis using appropriate statistical and/or other analytical tools. Presentation of the analysis results in tabular or graphical formats for easy assimilation.

SUMMARY/CONCLUSIONS/RECOMMENDATION

Very brief description of the project and the conclusions reached.

REFERENCES

List of references cited.

ACKNOWLEDGEMENTS

Give credit to where it belongs.