FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—COURSE CHANGE REQUEST[1]

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

DEPARTMENT: CIVIL, ENVIRONMENTAL AND GEOMATICS ENGINEERING	COLLEGE: ENGINEERING AND COMPUTER SCIENCE
COURSE PREFIX AND NUMBER: CEG 6708	CURRENT COURSE TITLE: Groundwater Contamination
CHANGE(S) ARE TO BE EFFECTIVE (LIST TERM):	____ TERMINATE COURSE (LIST FINAL ACTIVE TERM):
CHANGE TITLE TO: CHANGE PREFIX FROM: TO: CHANGE COURSE NO. FROM: TO: CHANGE CREDITS[2] FROM: TO: CHANGE GRADING FROM: TO: CHANGE DESCRIPTION TO:	CHANGE PREREQUISITES/MINIMUM GRADES TO*: NONE CHANGE COREQUISITES TO*: CHANGE REGISTRATION CONTROLS TO: *Please list both existing and new pre/corequisites, specify AND or OR, and include minimum passing grade. MINIMUM PASSING SCORE IS A C
Attach syllabus for **ANY** changes to current course information.	
Should the requested change(s) cause this course to overlap any other FAU courses, please list them here.	Please consult and list departments that might be affected by the change(s) and attach comments.[3]

Faculty contact, email and complete phone number:
Dr. Panagiotis (Pete) D. Scarlatos, Professor, Engineering West (EG-36) Bldg., Room 218,
561-297-0466
pscarlat@fau.edu

Approved by:	*Date:*
Department Chair:	9/29/14
College Curriculum Chair:	9/29/14
College Dean:	10/1/2014
UGPC Chair:	10/8/14
Graduate College Dean:	10-15-14
UFS President:	
Provost:	

1. **Syllabus** must be attached; see guidelines for requirements: *www.fau.edu/provost/files/course_syllabus.2011.pdf*
2. Review **Provost Memorandum: Definition of a Credit Hour** *www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf*
3. **Consent** from affected departments (attach if necessary)

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.

Department of Civil Environmental and Geomatics Engineering
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
Groundwater Contamination - CEG 6708	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: None	
3. Course logistics	
Term: Summer (Term-2) 2011 This is a classroom lecture course *Class location and time*: M-W 3:00 PM -6:10 PM (Lecture) CM-125	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Dr. Panagiotis (Pete) D. Scarlatos, Professor & Chair Engineering West (EG-36) Bldg., Room 204 M-W 1:00 PM -3:00 PM 561-297-0466 pscarlat@fau.edu
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	N/A
6. Course description	
Sources and types pf groundwater contamination; hydro-geologic site investigations; contaminant transport mechanisms; contaminant fate processes; modeling of groundwater contamination; non-aqueous phase liquids; groundwater remediation methods.	

7. Course objectives/student learning outcomes/program outcomes

Department of Civil Environmental and Geomatics Engineering
Florida Atlantic University
Course Syllabus

Course objectives	I. Provide to students a review of the fundamental concepts and equations of groundwater flow. II. Establish student's skills in basic methods regarding hydro-geologic investigations. III. Develop students' ability to solve problems involving contaminant transport mechanisms. IV. Develop student's ability to utilize modeling tools for solving groundwater contamination problems. V. Prepare students for engineering work in management and remediation groundwater pollution involving aqueous and non-aqueous phase liquids.	
Student learning outcomes	A. Ability to understand and use the various units of measure and basic physical parameters to analyze groundwater flow characteristics. B. Ability to analyze and interpret hydro-geologic data. C. Ability to understand and apply basic equations to analyze, model and solve problems involving contaminant transport in groundwater. D. Ability to understand and assess the various sources and chemicals commonly involved in groundwater contamination. E. Ability to understand, apply and communicate engineering principles for groundwater remediation methodologies.	
Relationship to program outcomes	**Outcome 1**: An understanding of professional and ethical responsibility. **Outcome 2**: A working knowledge of fundamentals, engineering tools, and experimental methodologies. **Outcome 3**: An understanding of the social, economic, and political contexts in which engineers must function. **Outcome 4**: An ability to plan and execute an engineering design to meet an identified need. **Outcome 5**: An ability to function on multi-disciplinary teams. **Outcome 6**: An ability to communicate effectively. **Outcome 7**: Graduates will have proficiency in the following areas of civil engineering: (i) structural engineering, (ii) transportation engineering, (iii) geotechnical engineering, (iv) water resources, and (v) environmental engineering. **Outcome 8**: Graduates will have an adequate appreciation for the role of civil engineering in infrastructure planning and sustainability including safety, risk assessment, and hazard mitigation. **Outcome 9**: Graduates will be successful in finding professional employment and/or pursuing further academic studies.	High High Medium High High High High High High

8. Course evaluation method

Mid Term Exam I:	25%	*Note*: The minimum grade required to pass the course is B.
Final Exam:	35%	
Project report:	20%	
Homework:	20%	

9. Course grading scale

There is not any fix criteria for the grading scale. The overall performance as related to course objectives and outcomes is evaluated and considered during grading.

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

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 exam should be administered and proctored by department personnel unless there are other pre-approved arrangements.
Late work is not unacceptable.
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.

11. Special course requirements

N/A

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. Computers must be closed and turned off in class
3. You can leave only on breaks
4. 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.
5. 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.
6. 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.
7. Assignments are due at the beginning of class on the date indicated on the assignment sheet.

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. 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

13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.

14. Honor code policy

Consultation with your classmates on assignments is expected and encouraged; however what you turn in must be your own work. Representing the work of others as your own is unethical and may result in sanctions (see the FAU Policy on Academic Honesty). FAU is committed to a policy of honesty in academic affairs. The instructor's duty is to pursue any reasonable allegation, taking action where appropriate, as described in the appropriate section of the FAU Catalog (http://www.fau.edu/ug-cat/academic.htm#irregular) and the Florida Administrative Code. Please be advised that the copying of

material from the world wide web or any other written material is considered plagiarism and is also a breach of the Honor Code.

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.

Florida Atlantic University
Regulation 4.001 Code of Academic Integrity
(1) Purpose. Students at Florida Atlantic University are expected to maintain the highest ethical standards. 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 an unfair advantage over any other. Dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility.

(2) Definitions. The FAU Code of Academic Integrity prohibits dishonesty and requires a faculty member, student, or staff member to notify an instructor when there is reason to believe dishonesty has occurred in a course/program requirement. The instructor must pursue any reasonable allegation, taking action where appropriate. Examples of academic dishonesty include, but are not limited to, the following:

(A) Cheating
1. The unauthorized use of notes, books, electronic devices, or other study aids while taking an examination or working on an assignment.
2. Providing unauthorized assistance to or receiving assistance from another student during an examination or while working on an assignment.
3. Having someone take an exam or complete an assignment in one's place.
4. Securing an exam, receiving an unauthorized copy of an exam, or sharing a copy of an exam.
(B) Plagiarism
1. The presentation of words from any other source or another person as one's own without proper quotation and citation.
2. Putting someone else's ideas or facts into your own words (paraphrasing) without proper citation.
3. Turning in someone else's work as one's own, including the buying and selling of term papers or assignments.
(C) Other Forms of Dishonesty
1. Falsifying or inventing information, data, or citations.
2. Failing to comply with examination regulations or failing to obey the instructions of an examination proctor.
3. Submitting the same paper or assignment, or part thereof, in more than one class without the written consent of both instructors.
4. Any other form of academic cheating, plagiarism, or dishonesty.

(3) Procedures.
(A) If the instructor determines that there is sufficient evidence to believe that a student engaged in dishonesty, the instructor will meet with the student at the earliest possible opportunity and provide notice to the student of the instructor's perception of the

facts, the charges against the student, and the sanction. The instructor may not remove the student from the course until the appeal process has come to a conclusion.

(B) If, after this meeting, the instructor continues to believe that the student engaged in dishonesty, the instructor will provide the student written notice of the charges and the penalty. A copy of this statement shall be sent to the chair of the department or director of the school/program administering the course.

(C) The student is entitled to an opportunity to be heard at a meeting with the instructor and chair/director to review and discuss the instructor's charges/statement. Such request for a meeting must be made in writing and received by the chair/director within five (5) business days of receipt of the instructor's charges/statement. The purpose of the meeting is to discuss the facts and to advise the student of the appeal process. The chair/director will provide the student, the instructor, and the dean of the college administering the course a summary of both the student's position and the instructor's position.

(D) The student may appeal in writing to the dean of the college administering the course. The appeal must be received by the dean within five (5) business days of receipt of the chair/director's summary from the review meeting. The dean will convene a Faculty-Student Council ("Council"), which will be composed of the dean (or designee), two faculty members, and two students. The dean (or designee) will act as chair of the Council, direct the hearing, and maintain the minutes and all records of the appeal hearing, which will not be transcribed or recorded. The hearing is an educational activity subject to student privacy laws/regulations, and the strict rules of evidence do not apply. The student may choose to be accompanied by a single advisor, but only the student may speak on her/his own behalf. The student and instructor may present testimony and documents on his/her behalf. Additional witnesses may be permitted to speak at the dean's (or designee's) discretion and only if relevant and helpful to the Council. The Council will deliberate and make a recommendation to the dean to affirm or void the instructor's findings of academic dishonesty. The dean (or designee) will inform the student and instructor in writing of his/her findings of academic dishonesty after receipt of the Council's recommendation.

(E) The student may request an appeal in writing of the dean's findings of academic dishonesty to the University Provost (or designee) and include relevant documentation in support of such appeal. The University Provost (or designee) will notify the student, dean, and instructor of his/her decision in writing. This decision by the Provost (or designee) constitutes final University action.

(F) If there is a finding that the Code of Academic Integrity has been violated, the chair will notify the University Registrar that the following notation be included on both the student's official transcript and on the student's internal record: "Violation of Code of Academic Integrity, University Regulations 4.001." If such violation is appealed and overturned, the dean or University Provost (or their designees) will notify the University

Registrar that such notation should be removed from the student's transcript and internal record.

(4) Penalties.
(A) The instructor will determine the penalty to be administered to the student in the course. Penalty grades cannot be removed by drop, withdrawal, or forgiveness policy. Students should be aware that, in some Colleges/programs, failure in a course or a finding of dishonesty may result in other penalties, including expulsion or suspension from the College/program.

(B) In the case of a first offense, the student may elect to complete a peer counseling program administered by the Division of Student Affairs by the end of the semester following the semester in which the dishonesty occurred. Upon successful completion of this program, the notation regarding violation of the Code of Academic Integrity will be expunged from the student's official transcript. The grade, however, will remain unchanged and cannot be removed by drop or forgiveness policy. Also, the notation will remain in internal University student records.

(C) In the case of a repeat offense, even if the notation of violation of the Code of Academic Integrity from the first offense had been expunged from the official transcript as a result of successful completion of the peer counseling program, the student will be expelled from the University.

Specific Authority: Article IX of the Florida Constitution, 1001.706, 1001.74 F.S., Board of Governors Regulations 1.001, 6.010, and 6.0105. History–New 10-1-75, Amended 12-17-78, 3-28-84, Formerly 6C5-4.01, Amended 11-11-87. Formerly 6C5-4.001. Amended 5-26-10

See University Regulation 4.001 at www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf.

15. Required texts/reading

1. "*Ground Water Contamination – Transport and Remediation*" by Philip B. Bedient, Hanadi S. Rifai & Charles J. Newell, Prentice Hall PRT, 2nd Edition.
2. "*Contaminant Hydrogeology*" by C.W. Fetter, Prentice Hall, 2nd Edition. (optional)
3. *MODFLOW* by US EPA – User's Manual

16. Supplementary/recommended readings

1) Bear, J., 1979. "*Hydraulics of Groundwater*", McGraw-Hill Series in Water Resources and Environmental Engineering, New York, New York.
2) De Marsily, G., 1981. "*Quantitative Hydrogeology – Groundwater Hydrology for Engineers*", Academic Press, San Diego.
3) Elfeki, A.M.M., Uffink, G.J.M. & Barends, F.B.J., 1997. "*Groundwater Contaminant Transport – Impact of Heterogeneous Characterization*", A.A. Balkema, Rotterdam, Netherlands.
4) Freeze, R.A. & Cherry, J.A., 1979. "*Groundwater* ", Prentice Hall, Englewood Cliffs, N.J.
5) Hermance, J.F., 1999. "*A Mathematical Primer on Groundwater Flow – An Introduction to the Mathematical and Physical Concepts of Saturated Flow in the Subsurface*", Prentice Hall, Upper Saddle River, N.J.
6) Knox, R.C., Sabatini, D.A. & Canter, L.W., 1993. "*Subsurface Transport and Fate Processes*", Lewis Publishers, Boca Raton, Florida.
7) Raudkivi, A.J. & Callander, R.A., "*Analysis of Groundwater Flow*", Edward Arnold, London, U.K.
8) Remson, I., Hornberger, G.M. & Molz, F.J., 1971. "*Numerical Methods in Subsurface Hydrology – With an Introduction to the Finite Element Method*", Wiley-Interscience, New York, New York.
9) Stone, W.J., 1999. "*Hydrogeology in Practice – A Guide to Characterizing Ground-Water Systems*", Prentice Hall, Upper Saddle River, N.J.
10) Tindall, J.A. & Kunkel, J.R., 1999. "*Unsaturated Zone Hydrology for Scientists and Engineers*", Prentice Hall, Upper Saddle River, N.J.

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

Lectures	
Date	*Topic*
Mon May 16 Wed May 18	Introduction; Fundamental concepts of groundwater; Units; Definitions. Confined and unconfined aquifers; Well hydraulics.
Mon May 23 Wed May 25	Sources and types of groundwater contamination. Hydro-geologic site investigations.
Mon May 30 Wed Jun 01	*Memorial Day – No Class* Contaminant transport mechanisms.
Mon Jun 06 Wed Jun 08	Contaminant fate processes. Modeling biodegradation and natural attenuation.

Mon Jun 13 Wed Jun 15	Flow and transport in the unsaturated zone. Numerical modeling of contaminant transport.
Mon Jun 20 Wed Jun 22	Non-aqueous phase liquids. Groundwater remediation methodologies.