

**Graduate Council Report**

**June 2, 2011**

**New Courses**

**CVEN 740. Advanced Constitutive Behavior of Cementitious Materials. (3-0). Credit 3.** Advanced multi-scale constitutive behavior of cementitious materials, including: composite behavior, elasticity, viscoelasticity, aging, free strains, poromechanical behavior, thermal and moisture strains, and thermal, moisture, and ionic transport; focus on experimental observation and analytical modeling. Prerequisites: CVEN 343 or CVEN 622 or approval of instructor.

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Texas A&M University  
 Departmental Request for a **New Course**  
 Undergraduate • Graduate • Professional  
 • Submit original form and attach a course syllabus.

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R. AUTENRIETH

GRADUATE STUDIES Form Instructions

1. Request submitted by (Department or Program Name): Civil Engineering
2. Course prefix, number and complete title of course: CVEN 740 Advanced Constitutive Behavior of Cementitious Materials
3. Catalog course description (not to exceed 50 words): Advanced multi-scale constitutive behavior of cementitious materials, including: composite behavior, elasticity, viscoelasticity, aging, free strains, poromechanical behavior, thermal and moisture strains, and thermal, moisture, and ionic transport: focus on experimental observation and analytical modeling.

4. Prerequisite(s): CVEN 343 or CVEN 622 or approval of instructor

Cross-listed with: \_\_\_\_\_ Stacked with: \_\_\_\_\_  
 Cross-listed courses require the signature of both department heads.

5. Is this a variable credit course?  Yes  No If yes, from \_\_\_\_\_ to \_\_\_\_\_
6. Is this a repeatable course?  Yes  No If yes, this course may be taken \_\_\_\_\_ times.  
 Will this course be repeated within the same semester?  Yes  No

7. This course will be:  
 a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)  
 \_\_\_\_\_  
 b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)  
M.S., Ph.D. in Civil Engineering

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**

9. 

Prefix	Course #	Title (excluding punctuation)				
C V E N	7 4 0	A D V C O N S T B E H C E M E N T M A T				
Lect.	Lab	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
0 3	0 0	0 3	1 4 1 8 0 1 0 0 0 6	0 6 3 0	1 2 - 1 3	0 0 3 6 3 2

Approval recommended by: \_\_\_\_\_ Level **6**

John Niedzwecki [Signature] \_\_\_\_\_ Date  
 Department Head or Program Chair (Type Name & Sign)

Robin Autenrieth [Signature] 5-13-11 Date  
 Chair, College Review Committee

Robin Autenrieth [Signature] 5-13-11 Date  
 Dean of College

Mark Zoran [Signature] 6-2-11 Date  
 Chair, GC or UCC

Submitted to Coordinating Board by: \_\_\_\_\_ Date  
 Associate Director, Curricular Services

Effective Date \_\_\_\_\_

**CVEN 740**  
**Advanced Constitutive Behavior of Cementitious Materials**  
**Fall 2011**

Instructor: Zachary Grasley, Ph.D.  
Office: 503C CE/TTI Bldg.  
Phone: 845-9961  
E-mail: [zgrasley@civil.tamu.edu](mailto:zgrasley@civil.tamu.edu)  
Homepage: <http://ceprofs.civil.tamu.edu/zgrasley>  
Office Hours: TR 9:30-10:30am or by appointment

Meeting time and place: TR 8am – 9:15am, CVLB 115

Course Credit Hours: Lecture: 3, Lab: 0, Total: 3 hrs

Textbook: None

Reference books:

1. Mindess, Young, & Darwin -Concrete
2. Findley, Lai, and Onaran –Viscoelasticity
3. Coussy - Poromechanics
4. Wang – Poromechanics
5. Christensen -Composites

Prerequisites: CVEN 343 or CVEN 622 or approval of instructor

**Course Description**

Advanced multi-scale constitutive behavior of cementitious materials, including: composite behavior, elasticity, viscoelasticity, aging, free strains, poromechanical behavior, thermal and moisture strains, and thermal, moisture, and ionic transport. Focus is on experimental observation and analytical modeling.

**Course Objectives**

- Foster appreciation for the complexity of the mechanical and transport behavior of cementitious materials
- Stimulate new ideas for future research needs in cementitious materials or civil engineering materials in general
- Provide fundamental knowledge regarding theoretical concepts related to the course content along with advanced experimental and analytical techniques for investigating such theories and issues

**Grading Policy**

***Final Grade***

- |                       |     |
|-----------------------|-----|
| • Two Exams           | 30% |
| • Homework            | 30% |
| • Weekly oral reports | 10% |
| • Research project    | 30% |

*The first exam is tentatively scheduled as a take-home exam during week 7. The second exam will either be a take-home or taken during the final exam period.*

**Grading Scale**

90-100 A, 80-89 B, 70-79 C, 60-69 D, <60 F

### **Homework**

It is anticipated that approximately 5 homework assignments will be assigned during the semester. The assignments are due 1 week after they are assigned (unless noted) and are due at the beginning of the class.

### **Research project**

Each individual will choose a research topic based on an 'unsolved' issue related to the course. The research may use analytical, numerical, experimental techniques, or a combination. A 'grant proposal' must be completed by each student by the 7<sup>th</sup> week of class. At the end of the course, a 'journal paper' summarizing the findings must be submitted and a presentation given to the class.

### **Weekly oral reports**

Each week, each individual student will be required to read a journal paper relative to the topic at hand, and summarize this paper in a brief (5 minute) oral presentation to the class. The authors' objectives, findings, research strong and weak points should be noted in the oral presentation.

### **Submission of Work**

All written assignments shall be submitted with a cover letter formally addressed to the instructor identifying the assignment (homework or lab) and providing a brief description and the results of the work. The cover letter shall be typed. All assignments shall be clear, legible, and well organized.

### **Penalty for Late Work**

All assignments submitted after the due date and time will be considered late and will receive a 25% penalty per class period. Some absences may be excused by reasons provided in Section 7 Attendance of the Student Rules (<http://student-rules.tamu.edu/>), but this does not relieve the student of the responsibility for understanding the material and completing assigned work.

### **Grading Review**

After an assignment (or exam) has been graded and returned, the student will have 1 week to resubmit the assignment for re-grading if the student feels there has been an error in the grading process. The assignment (or exam) shall not be changed in any way from the original submitted work (i.e. additional writing, erasures, etc). All reviews must be submitted at the beginning of the class period and no more than 7 days after the assignment (or exam) has been returned.

### **Unethical Conduct**

*"An Aggie does not lie, cheat, or steal or tolerate those who do."* Students are expected to understand and abide by the Aggie Honor Code presented on the web at: <http://www.tamu.edu/aggiehonor> No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

## **ADA**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>.

## **Lecture Schedule**

<b><u>Week</u></b>	<b><u>Topic</u></b>
1	Introduction to concrete constitutive behavior/background
2	Composite behavior, effect of voids, particulates
3	Fiber reinforced composites
4	Elasticity, viscoelasticity
5	Viscoelasticity and aging
6	Nanomechanics to macromechanics in elasticity & viscoelasticity
7	Transport: Governing equations for thermal, diffusion, permeation
8	Transport: permeability, diffusion
9	Poromechanics & thermoelasticity
10	Free strains: thermal
11	Free strains: shrinkage
12	Free strains: shrinkage
13	Damage mechanics (guest lectures by Dr. Abu Al-Rub)
14	Introduction to computational models Project reports & presentations

## **Exam topics**

The first exam will cover the topics discussed in weeks 1 thru 6, the second exam will cover topics discussed in weeks 7 thru 14.