AUBURN UNIVERSITY

Date: 12/23/14 (MM/DD/YYYY)

Proposal Form For Addition And Revision Of Courses

1. Proposing College / School: Samuel Ginn College of Engineering

Department: Civil Engineering

2. Course Prefix and Number: CIVL 7720/7726 **3. Effective Term:** Fall 2015

4. Course Title: Earthquake Engineering

Abbreviated Title (30 characters or less):

5. Requested Action:

- ○ Renumber a Course — Current Course Number:
- ◉ Add a Course — Proposed Course Number:
- ○ Revise a Course — Type of Revision:

6. Course Credit:

Contact/Group Hours	Scheduled Type (e.g.: Lab, Lecture, Practicum, Directed Study)	Weekly or Per Term?	Credit Hours	Anticipated Enrollment
3	Lecture	Weekly	3	20

Maximum Hours (Repeatability): 3

Total Credit Hours: 3

7. Grading Type: ◉ Regular (ABCDF) ○ Satisfactory/Unsatisfactory (S/U) ○ Audit

8. Prerequisites/Corequisites:
Use "P:" to indicate a prerequisite, "C:" to indicate a corequisite, and "P/C:" to indicate a prerequisite with concurrency.

CIVL 7610, CIVL 5670/6670 or Faculty Pre-approval
For Distance Ed students all prerequisites are available Distance Ed.

9. Restrictions: *List specific restriction in space above.* ☐ College ☐ Major ☐ Standing ☐ Degree

10. Course Description:
(20 Words or Less; exactly as it should appear in the Bulletin)

Principles of earthquakes and earthquake engineering; Analysis and design of steel and reinforced concrete buildings for earthquakes

11. May Count Either: CIVL 7720 **or** CIVL 7726 *(Indicate if this particular course cannot be counted for credit in addition to another)*

12. Affected Program(s):
(Respond "N/A" if not included in any program; attach memorandum if more space is required)

Program Type (e.g. minor, major, etc.)	Program Title (e.g. MS in Chemistry, Performance Option, Minor in Art)	Requirement or Elective? (required or optional?)
Major	MS/MCE/PhD in Civil Engineering	Elective

13. Overlapping or Duplication of Other Units' Offerings:
(If course is included in any other degree program, is used as an elective frequently by other unit(s), or is in an area similar to that covered by another college/school, attach correspondence with relevant unit)

○ Applicable
◉ Not Applicable

14. Justification:

Earthquake engineering is required all over the United States. This course is important to developing the knowledge, skills and abilities to design structures for these effects.

(Include a concise, yet adequate rationale for the addition/revision of the course, citing accreditation, assessments (faculty, graduate, and/or external) where applicable)

15. Resources:

Not Applicable

(Indicate whether existing resources such as library materials, classroom/laboratory space, and faculty appointments are adequate to support the proposed addition/revision; if additional resources are required, indicate how such needs will be met, referencing the appropriate level of authorization -- i.e.: Dean -- where necessary; if no additional resources or shifting of resources will be necessary, respond "Not Applicable")

16. Student Learning Outcomes:

Students will understand the basics of earthquake seismology and how the site geology effects ground motions. Students will understand how earthquake ground motions effect structures. Students will understand how to determine equivalent static loads to represent earthquake effects. Students will understand the basic premise of ductility-based design for life-safety design of structures. Students will understand how to design and detail structural steel and reinforced concrete structures for seismic events.

(State in measurable terms (reflective of course level) what students should be able to do when they have completed this course)

17. Course Content Outline:

Week, Subject, Assignments Due
1. Introduction to Earthquake Engineering and Earthquake effects and measurements
2. Earthquake effects and measurements, HW 1 due
3. Basic principles of earthquake engineering,
4. Building code provisions for seismic design, HW 2 due
5. Equivalent lateral force method for seismic design and analysis
6. Modal response spectrum method for seismic design and analysis, HW 3 due
7. Deflection criteria, diaphragm forces and load path, HW 4 due
8. Design and detailing of steel moment frames, Exam 1
9. Design and detailing of steel braced frame systems, Exam review
10. Design and detailing of steel braced frame systems
11. Design and detailing of reinforced concrete moment frames
12. Design and detailing of reinforced concrete shear walls, HW 5 due
13.Consideration of nonstructural components and systems
14. Advanced protective systems (base isolation)
15. Advanced protective systems (supplemental damping), Final Project Due

Lecture materials and content for Distance Ed students will be the same as for On Campus students. Videos of lectures are available to DE students through the Online Graduate Education Portal. All handouts are provided through Canvas and lecture method is recorded. All required software is available to DE students through Engineering Network Services. Students have access to professor through phone and email for questions or concerns.

(Provide a comprehensive, week-by-week breakdown of course content, including assignment due dates)

18. Assignments / Projects:

HW 1:Written assignment on fundamentals of Earthquake Engineering and Post Earthquake Reconnaissance Reports
HW 2: Written report and presentation on hazard for US and Worldwide Site
HW 3: Linear and nonlinear response of structures to ground motions (textbook and instructor developed problems)
HW 4: Development of site hazard and seismic design loads
HW 5: Preliminary design of project structure
Final Project: Design of lateral resisting system for steel buildings. Completed as a team.
For Distance Ed students all homework and projects will be the same with the exception of the final project. The scale of the final project is reduced so

that it is equivalent work with similar breadth and depth for a single student compared to the On Campus students who are working as a team. Exams are proctored through the Engineering and Business Online Program.

(List all quizzes, projects, reports, activities and other components of the course grade -- including a brief description of each assignment that clarifies its contribution to the course's learning objectives)

19. Rubric and Grading Scale:

Homework - 35%
Midterm Exam - 30%
Final Project - 35%
90.0-100 - A
80.0 - 89.9 - B
70.0 - 79.9 - C
60.0 - 69.9 - D
<59.9 - F
Weighting and grade scale is the same for On Campus and Distance Ed students

(List all components of the course grade -- including attendance and/or participation if relevant -- with point totals for each; indicate point totals and ranges or percentages for grading scale; for S/U grading, detail performance expectations for a passing grade)

20. Justification for Graduate Credit:

This course requires a background that is only achieved by previous graduate classes and requires a significant amount of reading outside the lecture materials. The topics covered in the class relate to structural dynamics, linear and nonlinear response and detailing for ductility past initial strength and require significant out-of-class learning by the students. There is not only one right answer to the problems so the students have to learn to deal with some uncertainty.

(Include a brief statement explaining how the course meets graduate educational standards (i.e.: rigorous standards for evaluation, development of critical thinking and analytical skills, etc.))

(Included below are standard statements regarding course policies. If necessary, a statement may be altered to reflect the academic policies of individual faculty members and/or the academic unit or department, provided that there is no conflict with the Student Policy eHandbook, Faculty Handbook, or any existing university policy.)

POLICY STATEMENTS

Attendance: Although attendance is not required, students are expected to attend all classes, and will be held responsible for any content covered in the event of an absence.

Excused Absences: Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student's immediate family, the death of a member of the student's immediate family, trips for student organizations sponsored by an academic unit, trips for university classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. Please consult the **Student Policy eHandbook** for more information on excused absences.

Make-Up Policy: Arrangement to make up a missed major examination (e.g.:hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.

Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the **Student Policy eHandbook** will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Disability Accommodations: Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

Approvals

Department Chair / Head	Date 12/23/14
College / School Curriculum Committee	Date 1/20/15
College / School Dean	Date 1/20/15
Dean of the Graduate School *(for Graduate Courses)*	Date
Assoc. Provost for Undergraduate Studies *(for Undergraduate Courses)*	Date

Contact Person:	Justin D. Marshall	**Telephone:**	334-844-7145
E-Mail Address:	jdm0022@auburn.edu	**Fax:**	334-844-6290

Course Syllabus – CIVL 7720 Earthquake Engineering

Spring 2016

Instructor – Justin D. Marshall, PhD, PE

Email – jdmarshall@auburn.edu

Office – 222 Harbert Engineering Center

Class Location & Time – TBD

Required Textbook – Dynamics of Structures: Theory and Applications to Earthquake Engineering, 3rd Edition, Anil K. Chopra, ISBN: 0-13-156174

Other Reference Materials - NEHRP Recommended Seismic Provisions for New Buildings and Other Structures, 2009 Edition, FEMA P-750. (The instructor will provide CDs with the pdf version of this document. Each student who wants a hard copy should order it from the FEMA Library by calling 1-800-480-2520)

ASCE/SEI 7-10: *Minimum Design Loads for Buildings and Other Structures* (Required sections will be distributed by the instructor for those who do not have a copy available)

ANSI/AISC 341-10: *Seismic Provisions for Structural Steel Buildings* (Available for free download http://www.aisc.org/content.aspx?id=2884 or within the AISC Seismic Design Manual which can be purchased as a student for $120 through the instructor)

ANSI/AISC 358-10: *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* (Available for free download, http://www.aisc.org/content.aspx?id=2884, will be posted to blackboard)

ACI 318-11: *Building Code Requirements for Structural Concrete and Commentary* (Required sections will be distributed by the instructor for those who do not have a copy available)

Introduction & Scope – This course in earthquake engineering is a design oriented course which will cover design of structures according to current design codes (ASCE 7/IBC) including an understanding of the technical basis of the provisions. In addition, we will cover the specific detailing provisions for concrete and steel structures and learn about design of structures using seismic protection systems such as base isolation or supplemental damping systems.

Learning Process – The learning process is a two-way exchange of ideas. It requires action from both parties. Both the instructor and the students have key responsibilities to enable effective exchange of ideas leading directly to learning and personal development.

Instructor Responsibility – As an instructor my responsibility is to actively engage students, to create an effective learning environment, and to present the course content in a clear, concise and interesting manner. You can expect me to come to class every day prepared to meet these requirements.

Student Responsibility – As a student your responsibility is to come to class prepared to learn and actively engage in the learning process. This participation includes reading prior to class, attending class regularly and providing feedback to the instructor in the form of questions when something is unclear.

Grading – The course grades will be based on the following percentages:

Homework	35%	Midterm Exam	30%
Final Project	35%		

Course Grades – Final course grades will be assigned based on the following standard:

>=90	A	60 – 69	D
80 – 89	B	<60	F
70 – 79	C		

The grades listed are the minimum grades assigned for the numerical grade you earn. The instructor reserves the right to positively adjust grades based on regular attendance, in-class participation and being actively involved in the learning process.

Homework – Homework will be assigned regularly throughout the semester. The homework due date will be listed on each homework assignment. It will be due at the beginning of class on the due date. **Late homework will not be accepted.** The only exceptions to this will be preapproval through the instructor or a medical emergency, which requires a note from medical personnel. The final project will be completed in a group. It will be due on the last day of class.

Sloppy and unorganized homework will result in lost points. Learning to organize your calculations in a readable and organized format will be a valuable tool for future academic and professional pursuits.

Exams/Quizzes – There will be one mid-term exam. It will be scheduled a minimum of two weeks in advance. The course objectives to be covered on the midterm exam will be clearly explained prior to the exam.

A calculator is the only acceptable electronic device allowed during exams. All other electronic devices with communication capabilities are prohibited during exams including computers, cell phones, PDAs, cameras, MP3 players, Ipods, etc.

Academic Dishonesty -- Turning in work done by another for an exam or a homework assignment is considered academic dishonesty. Allowing another to turn in work copied from you is also academic dishonesty. Such behavior also violates ethical standards for engineering practice. All suspicions of academic dishonesty will be reported as outlined in the Academic Dishonesty Code (Chapter 1200 of the SGA Code of Laws).

Disability Statement -- It is the policy of Auburn University to provide accessibility to its programs and activities and a reasonable accommodation for qualified students with disabilities. Students desiring additional information should contact the Office of Accessibility, 1228 Haley Center, (334) 844-2096 (Voice/TT), accessibility@auburn.edu.

Course Topics

- Earthquake Effects and Measurement
- Basic Principles of Earthquake Engineering and Structural Behavior
- Building Code Provisions for Seismic Design (ASCE 7-10 Chapters 11-12)
- Design of Steel Lateral Force Resisting Systems (Moment Frame, Concentric Brace, Buckling-Restrained Brace)
- Design of Concrete Lateral Force Resisting Systems (Moment Frame, Shear Wall)
- Non-structural Element Considerations
- Advanced Protective Systems (Base Isolations, Dampers)