Structural Engineering
Graduate Student Handbook

Zachry Department of Civil Engineering
2016-2017
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Overview
Program Overview

Structural engineering is the field of engineering particularly concerned with the design of load-bearing structures. The field crosses engineering disciplines, and structural engineering can be found within civil, mechanical, and aerospace engineering. Within civil engineering, it is largely the implementation of mechanics to the design of the large structures that are fundamental to basic living, such as buildings, bridges, walls, dams, and tunnels.

An experienced engineer would tend to design more complex structures, such as multistory buildings (including skyscrapers) or bridges. It is in the design of these more complex systems that a structural engineer must draw upon creativity in the application of mechanics principles. New structural systems and novel application of materials result from this process, and new technologies, such as control and damage detection systems, are now found in civil engineering structures, where traditionally they were only found in mechanical or aerospace systems. Courses at the graduate level build the basic structural knowledge of the traditional systems and materials of our field and expose students to new technologies and approaches that will become part of standard practice within the career of our students.

Research areas of our faculty include:

- Building, Transportation, & Offshore Structures
- Damage Detection and Assessment
- Engineering Risk Analysis
- Fatigue & Fracture
- Preservation of Historic Structures
- Seismic & Wind Performance
- Smart Materials & Structures
- Structural Reliability
- Vibrations, Sensing & Control
Faculty Members

Administration

Department Head: Robin Autenrieth
Associate Department Head – Research & Operations: Mark Burris
Associate Department Head – Academic Programs: Ray James
Division Head: Peter Keating
Assistant Dept. Head – Graduate Programs: Yunlong Zhang

Structural Engineering Faculty

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Degree Programs
Degree of Master of Engineering

A minimum of 30 semester credit hours of approved courses is required for the Master of Engineering degree (MEng). The university places limitations on these credit hours in addition to the requirements of the structural engineering program that are listed below. **A key requirement is that approximately 1/3 of the 30 required credit hours of coursework must be taken outside the major area of study, which is structural engineering for our program.** A complete discussion of all university requirements is found in the current Texas A&M University Graduate Catalog under the heading “The Degree of Master of Engineering.” (available on the Internet at http://www.tamu.edu/admissions/catalogs/)

A. Advising Committee

The Master of Engineering program for structural engineering has a standard advisory committee with only one departmental member:

- Dr. Joe Bracci (chair);

No external members are required for this degree plan. It is permissible for another faculty member from Structural Engineering Faculty to serve as your committee chair. In that event, unless explicitly waived, Dr. Bracci should be added as a committee member to double check that all requirements for the ME degree are met.

B. Prerequisites

All of the following courses (and their pre- and co-requisite coursework) are considered prerequisite to the MEng program of study in structural engineering: CVEN 302, CVEN 345, CVEN 444, CVEN 445, CVEN 446, and MATH 308, or equivalents that are approved by the structural engineering program. Courses listed for which a student lacks credit must be completed, but those credits cannot be applied toward the 30 semester credit hour degree requirement. Pre-requisite coursework needs to be completed during your first semester at Texas A&M University, as they are pre-requisites for all our graduate courses.

C. Degree Plan

The degree plan for Master of Engineering Students has a set of common courses, and the elective courses listed are chosen to enhance the overall education for a practicing structural engineer. In order to meet the breadth requirement, 3 courses in the degree plan must be outside the focus area of structural engineering. One of the common required courses already meets this requirement while the other two must come from the elective coursework. Course labeled with (***) in the following sections satisfy this requirement.
The proposed degree plan must be typed on the official form as it appears on the Internet at http://ogs.tamu.edu/ and submitted electronically to your graduate advisor and advisory committee for their electronic endorsement. Master of Engineering students are expected to submit their degree plan within 1 month after the start of their second semester.

1. **Required Coursework – 18 hours**

   **1. Engineering Mechanics – 9 semester credit hours**
   - CVEN 633 Advanced Mechanics of Materials (typically in Fall) (**)
   - CVEN 657 Dynamic Loads and Structural Behavior (typically in Fall)
   - A course in structural finite element analysis. The recommended course is:
     - CVEN 750 Finite Element Applications in Structural Engineering (typically in Spring).
     Alternatives are:
     - MEEN 672 Introduction to Finite Element Analysis (typically in Fall).
     - MEMA 646 An Introduction to the Finite Element Method (typically in Spring)

2. **Structural Element Behavior and Design – 6 semester credit hours**
   You are required to take at least two structural design courses – one from each group listed below. The two courses all ME students should take are indicated with an R. In the case that extreme mitigating circumstances are identified and approved by the committee the alternate course listed may be taken. The other courses in each group can be also be selected for your degree plan as electives, depending on individual student interest as well as course availability:

   **Group 1:**
   - CVEN 671 Behavior and Design of Prestressed Concrete Structures (typically in Fall) R
   - CVEN 621 Advanced Reinforced Concrete Design (typically in Spring)

   **Group 2:**
   - CVEN 659 Behavior and Design of Steel Structures (typically in Spring) R
   - CVEN 670 Behavior and Design of Composite Structures (typically alternate years)

3. **Structural System Design – 3 semester credit hours**
   - CVEN 754 Structural Design Studio (typically in Spring)

2. **Elective Coursework – 12 hours**
   The student, in consultation with the advisory committee, will select a minimum of 12 additional semester credit hours of coursework to complement the overall objectives of the
proposed degree plan. A **maximum** of 3 semester credit hours of CVEN 685 Directed Studies can be applied toward this requirement. Additionally, a minimum of 6 of those hours must be outside of structural engineering (note that they CAN be in other civil engineering disciplines). Course labeled with (**) in the following sections satisfy this requirement.

Note that the electives are broken up into two groups: (1) Targeted Electives, and (2) Open Electives. At least 6 credit hours of your elective coursework must come from courses listed in the Targeted Electives group. The Targeted Elective group includes courses with a strong mathematical, solid mechanics and/or civil engineering structural design content. The remaining 6 credit hours may come from either group of courses. Note that the overall degree plan MUST support a future career in structural engineering and provide a breath of experience. **It is not appropriate to use all electives in a single secondary area of study.**

1. **Targeted (Technical) Elective Courses – minimum of 6 hours**

A minimum two of your elective courses must come from courses listed in this group. Courses within our department that fall in this category are:

- CVEN 656 – Bridge Engineering
- CVEN 662 – Experimental Methods in Civil Engineering
- CVEN 663 – Structural Stability
- CVEN 669 – Design of Structures for Hazardous Environmental Loads
- CVEN 686 – Offshore and Coastal Structures
- CVEN 648 – Advanced Numerical Methods in Geotechnical Engineering (**)
- CVEN 651 – Geomechanics (**)
- CVEN 652 – Soil Dynamics (typically every other Spring) (**)
- CVEN 666 – Foundation Structures (typically every Fall) (**)
- CVEN 683 – Dynamic Soil Structure Interaction (**)
- CVEN 687 – Foundation Engineering (typically every other Spring) (**)
- CVEN 699 – Engineering Risk Analysis (**)

All four courses listed under Structural Behavior and Design can be used to satisfy this elective requirement as well. The first two courses taken are used to satisfy the core coursework requirement, while additional courses in that group automatically can count towards elective requirements without prior approval.

Additional technical coursework related to the practice of structural engineering can be found outside the department. Those courses are:

- MATH 601 – Methods in Applied Mathematics I (**)
- MATH 602 – Methods in Applied Partial Differential Equations (**)
- STAT 601 – Statistical Analysis (**)
- STAT 626 – Methods in Time Series Analysis (**)
- OCEN 676 – Dynamics of Offshore Structures
2. Open Elective Courses – maximum of 6 hours

Additional courses that are not part of the targeted electives and that are relevant to structural engineering practice can be part of the degree plan. This includes some technical courses in other engineering areas, such as materials engineering and construction management. A maximum of 6 semester credit hours may be counted towards the required coursework. Some courses within civil engineering fall within this category, as well as some courses offered under Architecture and the Business School. Courses that are pre-approved for the ME degree:

- CVEN 624 – Infrastructure Engineering (**)
- CVEN 643 – Advanced Construction Methods and Analysis (**)
- CVEN 641 – Construction Engineering Systems (**)
- CVEN 644 – Project Risk Management (**)
- CVEN 695 – Frontiers in Civil Engineering Research (**)
- OCEN 671 – Ocean Wave Mechanics (**)
- OCEN 675 – Nonlinear Wave Mechanics (**)
- ACCT 640 – Accounting Concepts and Procedures (**)
- MGMT 655 – Survey of Management (**)
- FINC 635 – Financial Management for Non-Business (**)
- MKTG 621 – Survey of Marketing (**)
- ARCH 628 – Tools for Green Building Design (**)
- ARCH 646 – Historic Preservation Theory and Practice (**)
- ARCH 648 – Building Preservation Technology (**)
- ARCH 653 – Building Information Modeling (BIM) in Architecture (**)
- COSC 626 – Mechanical and Electrical Construction (HVAC Systems) (**)

3. Sample Degree Plan:

Fall Semester (12 hours)

- CVEN 633 – Advanced Mechanics of Materials (Required) (**)
- CVEN 657 – Dynamic Loads and Structural Behavior (Required)
- CVEN 671 – Behavior and Design of Prestressed Concrete Structures (Design Requirement)
- CVEN 666 – Foundation Structures (Targeted Elective) (**)

Spring Semester (12 hours)

- CVEN 750 – Finite Element Applications in Structural Engineering (Required)
- CVEN 689 – Structural Design Studio (Required)
- CVEN 659 – Behavior and Design of Steel Structures (Design Requirement)
- CVEN 669 – Design of Structures for Hazardous Environmental Loads (Targeted Elective)
Summer Semester (6 hours)

- Two elective courses

D. Writing Requirement and Waiver of Final Exam

The University has a writing requirement for all graduate degrees (whether or not that requirement is met with a research thesis). In our department, we can waive the oral examination requirement for the MEng degree, but cannot waive the report requirement. In order to ensure University rules are met, students pursuing the MEng degree need to submit a report you have individually written that contains a minimum of 7,000 words, or approximately 10 pages of text. The requirement is for writing, so text in figures and equations do not count. The report will typically be satisfied through successful completion of the Advanced Design Studio course. To submit your form to your chair,

Go to turnitin.com

ID 9757071 (Writing Requirement)

PS CVENSTRME

There are 2 assignments. If you have only 1 report exceeding 7000 words, put it in the first assignment. If you have more than one report, put one file in the 1st assigned and the remainder in the 2nd assignment. When you upload everything to the site, send Dr. Bracci an email (bracci@civil.tamu.edu) so that he can verify everything.

At the same time you submit your report(s), you should submit your request for the Waiver of Final Exam form to your committee chair. The form is available online through Office of Graduate Studies. Once your report has been reviewed and certified to meet the writing requirements, the waiver form will be signed by your committee chair. You must provide a minimum of 2 weeks for the review of the report and for the form to be signed. It is your responsibility to ensure enough time is provided in order to meet the deadlines by the university's Office of Graduate Studies (http://ogs.tamu.edu/).
Degree of Master of Science

A minimum of 32 semester credit hours of approved courses is required for the Master of Science degree (MS). At least 25 semester credit hours must be coursework. The university places limitations on these credit hours in addition to the requirements of the structural engineering program that are listed below. A complete discussion of all university requirements is found in the current Texas A&M University Graduate Catalog (available on the Internet at http://www.tamu.edu/admissions/catalogs/) under the heading “The Degree of Master of Engineering” for example, university requirements include a final examination and submission of a thesis to the university.

A. Advising Committee

The student must select an Advisory Committee Chair, who will serve as their graduate advisor, from the Department’s structural engineering graduate faculty. If a student wishes to have a Chair who does not have an appointment with the Department in the structural engineering group, then the committee must have two Co-Chairs, including one who is a member of the Department’s structural engineering graduate faculty. (A committee has either one Chair or two Co-Chairs.)

The chair and the student collaborate in selecting the remainder of the Advisory Committee. The advising committee for the Master of Science degree in structural engineering must have a minimum of three members from the Texas A&M graduate faculty (the chair counts as a member). There must be at least one member from outside the civil engineering department and there must be a majority from within the department.

B. Degree Plan

The student must identify their research supervisor before the start of their second semester of study, at which point an advisory committee will be formed including at least one full time structural engineering faculty member. The student’s advisory committee, in consultation with the student, will develop the proposed degree plan. The proposed degree plan must be typed on the official form as it appears on the Internet at http://ogs.tamu.edu/ and submitted electronically to your graduate advisor and advisory committee for their electronic endorsement. The office of graduate studies blocks students from further registration if a degree plan is not filed within 1 month after the start of their second semester. If you are blocked, you are not considered a full time student and become ineligible to receive any assistantship.
C. Prerequisites

All of the following courses are considered prerequisite to the MS program of study in structural engineering: CVEN 302, CVEN 345, CVEN 444, CVEN 445, CVEN 446, and MATH 308, or equivalents that are approved by the structural engineering program. Courses listed for which a student lacks credit must be completed, but those credits cannot be applied toward the 32 semester credit hour requirement. Note that you may have been required to complete additional pre-requisites as part of your admission into the program. Those classes also cannot be applied towards the degree credit hour requirement.

D. Required Coursework (18 semester credit hours):

All of the following courses are offered once each academic year unless otherwise noted.

1. **Applied Mathematics – 3 semester credit hours**
     - Recommended courses are:
       - MATH 601 – Methods in Applied Mathematics I
       - MATH 602 – Methods in Applied Partial Differential Equations
       - STAT 601 – Statistical Analysis
       - STAT 626 – Methods in Time Series Analysis

2. **Engineering Mechanics – 9 semester credit hours**
   - CVEN 633 Advanced Mechanics of Materials (typically in Fall)
   - CVEN 657 Dynamic Loads and Structural Behavior (typically in Fall)
   - Theory of Finite Elements course: choose one of the following
     - MEMA 647 – Theory of Finite Elements
     - MEMA 646 – Intro to Finite Elements
     - MEEN 672 – Introduction to Finite Element Method
     - Any equivalent course into the theory of finite elements (not an applications course) – requires prior approval for substitution

3. **Structural Behavior and Design – 6 semester credit hours**
   - CVEN 621 Advanced Reinforced Concrete Design (preferred – typically in Spring)
   - CVEN 659 Behavior and Design of Steel Structures (preferred – typically in Spring)
   - CVEN 670 Behavior and Design of Composite Structures (alternate years)
   - CVEN 671 Behavior and Design of Pre-stressed Concrete Structures (typically in Fall)

E. Elective Coursework (14 semester credit hours):

The student’s advisory committee, in consultation with the student, will select a minimum of 14 additional semester credit hours of coursework to complement the overall objectives of the
proposed degree plan. A maximum of 7 semester credit hours of CVEN 691 Research can be applied toward this requirement.

1. **Courses Offered Within the Department** *(typically alternate years)*

   The following is a list of some of the courses offered through the Civil Engineering Department that are specifically geared towards the master’s level:

   - CVEN 656 – Bridge Engineering
   - CVEN 669 – Design of Structures for Hazardous Environmental Loads
   - CVEN 663 – Structural Stability
   - CVEN 686 – Offshore and Coastal Structures
   - CVEN 699 – Engineering Risk Analysis
   - CVEN 687 – Foundation Engineering

   Other courses that may be of interest towards students interested in research (at both the Masters and PhD levels) and can be used to satisfy the elective coursework requirement include:

   - CVEN 655 – Structural Reliability
   - CVEN 683 – Dynamic Soil Structure Interaction
   - CVEN 751 – Advanced Dynamics and Control
   - CVEN 752 – Smart Structures
   - CVEN 753 – Damage Mechanics of Solids and Structures

   Additional graduate level courses are offered throughout the department and may be used to satisfy the elective coursework requirement with approval of the student’s advisory committee. Particularly for the MS degree, courses must be chosen so as to complement your research program. All four courses listed under Structural Behavior and Design can be used to satisfy this requirement as well. The first two courses taken are used to satisfy the core coursework requirement, while additional courses in that group automatically can count towards elective requirements without prior approval.

2. **Additional Technical Elective Courses: Applied Math and Other Engineering Disciplines**

   Additional coursework related to the practice of structural engineering can be found outside the department. Courses listed under MEMA, MATH and STAT can be particularly applicable, and any graduate level course in those departments is automatically acceptable pending approval of the student’s chair. Some suggested courses:

   - MEMA 601 Theory of Elasticity
• MEMA 602  Continuum Mechanics
• MEMA 605  Energy Methods
• MEMA 633  Theory of Plates and Shells

3. Other Relevant Non-Technical Coursework – maximum of 6 semester hours

Certain courses being offered under Architecture and the Business School are directly relevant to structural engineering practice and a maximum of 6 semester credit hours may be counted towards the required coursework. Courses pre-approved for the MS degree are:

• ACCT 640  Accounting Concepts and Procedures
• FINC 635  Financial Management for Non-Business
• MGMT 655  Survey of Management
• MKTG 621  Survey of Marketing
• ARCH 646  Historic Preservation Theory and Practice
• ARCH 648  Building Preservation Technology
Doctor of Philosophy

The Doctor of Philosophy (Ph.D.) degree is a research-oriented degree requiring a minimum of 64 semester credit hours of approved courses and research beyond the Master of Science (M.S.) degree in an approved and related program [96 credit hours beyond the Bachelor of Science (B.S.) degree]. The university places limitations on these credit hours in addition to the requirements of the Department of Civil Engineering and the Structural Engineering program listed below.

A complete discussion of all university requirements for the PhD degree is found in the current Texas A&M University Graduate Catalog, which is available on the Internet at http://www.tamu.edu/admissions/catalogs/, under the heading “The Degree of Doctor of Philosophy.” For example, university requirements include a preliminary examination, a final examination, and submission of a dissertation to the university.

NOTE: All documents requiring departmental signatures must be submitted to the Civil Engineering Graduate Office at least one day prior to the Office of Graduate Studies deadline.

A. Advising Committee

The student must select an Advisory Committee Chair, who will serve as their graduate advisor, from the Department’s structural engineering graduate faculty. If a student wishes to have a Chair who does not have an appointment with the Department in the structural engineering group, then the committee must have two Co-Chairs, including one who is a member of the Department’s structural engineering graduate faculty. (A committee has either one Chair or two Co-Chairs.)

The chair and the student collaborate in selecting the remainder of the Advisory Committee. The advising committee for the PhD degree in structural engineering must have a minimum of four members from the Texas A&M graduate faculty (the chair counts as a member). There must be at least one member from outside the civil engineering department and there must be a majority from within the department, with at least two members being from the structural engineering faculty (the chair counts as one of these members).

B. Departmental Requirements

In addition to fulfilling the University requirements for the Doctor of Philosophy (Ph.D.) degree, a student enrolled in the Civil Engineering graduate program in the area of Structural Engineering must satisfy the following department requirements.
• A minimum of 32 credit hours of graduate level coursework taken through Texas A&M University [a minimum of 24 credit hours if the student already has taken at least another 24 credit hours of graduate course work for the Master of Science (M.S.) or Master of Engineering (M.E.) degree].

• Remaining coursework requirement can be met by 32 hours of CVEN 691

C. Structures Area Requirements

The student must also satisfy the following area requirements and/or recommendations described below:

• **Qualifying Exam:** A Qualifying Examination will be scheduled with members of the Structural Engineering faculty. The exam will include both written and oral components. The exam should be taken after the first semester (Fall or Spring) of study and no later than the end of classes in the second semester (Fall or Spring) of study. A student may get special approval for a time extension of one additional semester if leveling courses (either technical or in English language) are required. In the structures area, the written component is typically taken the week before or within the first few weeks of the second semester of study. Currently, Dr. H. Jones coordinates the qualifying exam for structures students and is the contact person for additional information.

• **Degree Plan:** An advisory committee must be formed that includes at least two structural engineering faculty members, and a Degree Plan must be submitted and approved by the advisory committee after passing the Qualifying Exam and early during their second semester (Fall or Spring) of study. The degree plan must be filed before the course registration for the third semester of study. The proposed degree plan must be typed on the official form as it appears on the Internet at http://ogs.tamu.edu/ with endorsements by the student’s advisory committee.

• **Written Preliminary Exam:** After completion of a majority of the coursework listed on the Degree Plan (with the exception of CVEN 691 Research), but ideally no later than the end of the fourth semester (Fall or Spring) of study, a Written Preliminary Examination will be scheduled with members of the advisory committee. The specific scope is defined by the committee members and may include any topic in structural engineering. The goal is to get preliminary feedback early during the research process, so the preliminary exam should not be delayed. This exam consists of written questions from the advisory committee. The exam in total should be given over a period of one week. The Office of Graduate Studies (OGS) requires that this exam be completed at least 90 days before the final defense.
• **Oral Preliminary Exam:** After passing the Written Preliminary Exam, but ideally no later than the end of the fourth semester (Fall or Spring) of study, an Oral Preliminary Examination will be scheduled with members of the advisory committee. *The goal is to get preliminary feedback early during the research process, so the preliminary exam should not be delayed.* At this examination, the student will give a presentation of the Research Proposal. The questions in this exam will cover the material in the Research Proposal, Written Preliminary Exam, the Oral Preliminary Exam presentation, and any relevant coursework. The Office of Graduate Studies (OGS) requires that this exam be completed at least 90 days before the final defense.

• **Research Proposal:** As soon as the research project can be outlined in reasonable detail, but ideally no later than the end of the fifth semester (Fall or Spring) of study, the dissertation research proposal should be completed. The Research Proposal shall describe the proposed research, including relevant background information, and clearly demonstrate how this research will make a unique contribution of new knowledge to the student’s area of study. Upon approval of the Research Proposal by the advisory committee chair, the Research Proposal must be submitted to other members of the advisory committee at least 2 weeks (10 working days) prior to the Oral Preliminary Exam.

• **Completion of Dissertation:** Upon approval of the Dissertation by the advisory committee chair, the Dissertation will be submitted to the other members of the advisory committee at least 2 weeks (10 working days) prior to the Final Defense.

• **Final Defense:** A Final Defense consisting of an oral examination will be scheduled with all of the advisory committee members. At this examination, the student will give a presentation of the research work completed for the degree and documented in the Dissertation. The student is encouraged to invite other interested individuals to the research presentation.

**D. Recommended Coursework:**

The student’s advisory committee, in consultation with the student, will select coursework to complement the overall objectives of the proposed degree plan, with the majority of courses being in the field of structural engineering. Particularly for the Ph.D. degree, courses must be chosen so as to complement your research program as well as any future career goals. The courses listed below will typically have other graduate level courses as pre-requisites.

1. **Courses within Specialty Area Geared for Research Students**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CVEN 655</td>
<td>Structural Reliability</td>
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2. Graduate Courses required for ME and MS students

The courses listed below are part of the core course requirements for our masters students. While none of these courses are required for our doctoral students, they frequently serve as prerequisite courses for higher level courses. Most students admitted into our program have already taken these courses as part of their own master’s curriculum.

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>CVEN 621 Advanced Reinforced Concrete Design</td>
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<tr>
<td>CVEN 633 Advanced Mechanics of Materials</td>
<td>Yearly</td>
</tr>
<tr>
<td>CVEN 657 Dynamic Loads and Structural Behavior</td>
<td>Yearly</td>
</tr>
<tr>
<td>CVEN 659 Behavior and Design of Steel Structures</td>
<td>Yearly</td>
</tr>
<tr>
<td>CVEN 671 Behavior and Design of Prestressed Concrete Structures</td>
<td>Yearly</td>
</tr>
</tbody>
</table>

A student may decide to take one of these courses as part of their doctoral program to: (1) explore differences in design codes if their corresponding undergraduate coursework was in another country, or (2) their master’s degree was not in civil engineering and their curriculum would benefit from these core courses for a possible future in academia, or even in practice, within civil engineering.

3. Additional Graduate Elective Courses within Department

The courses listed below are also offered within the Structural Engineering specialty area and may be applicable to a student depending to their research focus:

<table>
<thead>
<tr>
<th>Course</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 656 Bridge Engineering</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>CVEN 669 Design of Structures for Hazardous Environmental Loads</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>CVEN 686 Offshore and Coastal Structures</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>CVEN 753 Damage Mechanics of Solids and Structures</td>
<td>Alternate Years</td>
</tr>
</tbody>
</table>

Note that doctoral students are NOT allowed to enroll in:

- CVEN 750 – Finite Element Applications in Structural Engineering
- CVEN 754 – Advanced Structural Design Studio
Several other courses are available throughout the department that may also be applicable. Some recommended courses include:

- CVEN 658 Civil Engineering Applications of GIS
- CVEN 661 Research Methods for Civil Engineers
- CVEN 689 Cementitious Materials
- CVEN 689 Concrete Microstructure, Behavior & Restoration
- CVEN 689 Durability and Service Life Prediction of Structural Systems
- CVEN 639 Methods for Assessing Structural System Performance

Additional coursework related to the practice of structural engineering can be found outside the department. Courses listed under MEMA, MATH and STAT can be particularly applicable. Some suggested courses:

- MEMA 601 Theory of Elasticity
- MEMA 602 Continuum Mechanics
- MEMA 605 Energy Methods
- MEMA 611 Fundamentals of Engineering Fracture Mechanics
- MEMA 633 Theory of Plates and Shells
- MEMA 641 Plasticity Theory
- MEMA 646 Introduction to the Finite Element Method
- MEMA 647 Theory of Finite Element Analysis
- MEMA 648 Nonlinear Finite Element Methods in Structural Mechanics
- MATH 601 Methods of Applied Mathematics I
- MATH 602 Methods and Applications of Partial Differential Equations
- STAT 601 Statistical Analysis

**E. Recommended Course Plans:**

The following sample degree plans provide some possible courses to consider based on the stated emphasis areas. Final coursework selection should be made in consultation with the advisory committee.
<table>
<thead>
<tr>
<th>Earthquake Engineering and Structural Dynamics</th>
<th>Structures and Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 655 Structural Reliability</td>
<td>CVEN 622 Properties of Concrete</td>
</tr>
<tr>
<td>CVEN 663 Structural Stability</td>
<td>CVEN 662 Experimental Methods in Civil Engineering</td>
</tr>
<tr>
<td>CVEN 669 Design of Structures for Hazardous Environmental Loads</td>
<td>CVEN 663 Structural Stability</td>
</tr>
<tr>
<td>CVEN 683 Dynamic Soil Structure Interaction</td>
<td>CVEN 655 Structural Reliability</td>
</tr>
<tr>
<td>CVEN 751 Advanced Dynamics &amp; Control of Civil Structures</td>
<td>CVEN 753 Damage Mechanics of Solids and Structures</td>
</tr>
<tr>
<td>CVEN 752 Smart Structures</td>
<td>CVEN 689 Durability and Service Life</td>
</tr>
<tr>
<td>MEMA 648 Nonlinear Finite Element Methods in Structural Mechanics</td>
<td>Prediction of Structural Systems</td>
</tr>
<tr>
<td>Additional courses tailored to student’s research and interests</td>
<td>MEMA 602 Continuum Mechanics</td>
</tr>
<tr>
<td></td>
<td>MEMA 611 Fundamentals of Engineering Fracture Mechanics</td>
</tr>
<tr>
<td></td>
<td>STAT 601 Statistical Analysis</td>
</tr>
<tr>
<td></td>
<td>Additional courses tailored to student’s research and interests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smart Structures and Control</th>
<th>Reliability and Probabilistic Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 669 Design of Structures for Hazardous Environmental Loads</td>
<td>CVEN 699 Engineering Risk Analysis</td>
</tr>
<tr>
<td>CVEN 683 Dynamic Soil Structure Interaction</td>
<td>CVEN 655 Structural Reliability</td>
</tr>
<tr>
<td>CVEN 751 Advanced Dynamics &amp; Control of Civil Structures</td>
<td>CVEN 660 Probabilistic Structural Dynamics</td>
</tr>
<tr>
<td>CVEN 752 Smart Structures</td>
<td>STAT 601 Statistical Analysis</td>
</tr>
<tr>
<td>CVEN 631 Identification of Civil Engineering Systems</td>
<td>Additional courses tailored to student’s research and interests</td>
</tr>
<tr>
<td>MEMA 648 Nonlinear Finite Element Methods in Structural Mechanics</td>
<td></td>
</tr>
</tbody>
</table>
Graduate Coursework
Pre-requisite Coursework

All of the following courses (and their co- and pre-requisites) are considered prerequisite to any graduate program of study in structural engineering:

CVEN 302 – Computer Applications in Engineering and Construction
CVEN 345 – Theory of Structures
CVEN 444 – Structural Concrete Design
CVEN 445 – Matrix Methods of Structural Analysis
CVEN 446 – Structural Steel Design
MATH 308 – Differential Equations

None of these courses may be counted towards any graduate degree in structural engineering. You may have been required to complete additional pre-requisites as part of your admission into the program. Those classes also cannot be applied towards the credit hour requirement. Pre-requisite coursework needs to be completed during your first semester at Texas A&M University, as they are pre-requisites for all our courses.

If you completed a pre-requisite before arriving at Texas A&M University and need it waived, you must bring a copy of your transcript showing the final grade in the course as well as a copy of the course syllabus to Dr. Bracci. You can drop it off in his box or with the Administrative Assistant on the 7th floor of the CE/TTI Building. These will then be reviewed to see if indeed they satisfy the requirements, at which time this information will be communicated to the Civil Graduate Office. The review process can take up to two weeks.

Course Description & Typical Schedule

A range of courses are offered within the Zachary Department of Civil Engineering. For a full listing and description of the courses, please refer to the Graduate Course Catalog. Keep in mind that graduate courses are typically only offered once a year at most, with many of the elective courses only being offered on alternate years.

The following is a table indicating the typical course offering frequency and suggested pre-requisites. Keep in mind that the actual course offering schedule may differ from the table below. Pre-requisite coursework listed are course numbers in the Civil Engineering department unless otherwise noted. Keep in mind that all graduate courses have the program pre-requisites automatically applied, and any graduate course with a listed pre-requisite also has the option of “by approval of the instructor.”
### Transfer Credit

A maximum of two courses taken at other universities may be applied towards your Master’s degree (ME or MS) at Texas A&M University. For the doctoral program, a maximum of three courses may be applied, pending permission of the student’s research committee, as long as the number of credit hours does not exceed one-third of the total coursework hours taken at Texas A&M University.

In order to use transfer courses on your degree plan, the courses must have been taken in residence at an accredited U.S. institution or an approved international institution. You can verify its status with either Graduate Admissions or International Admissions. In addition, you must have earned a grade of “B” or better, and you must have been in degree seeking status at either that institution or at Texas A&M University at the time the course(s) were taken. **Academic work used toward a previous degree may not be used again.**

To receive departmental approval, the student must submit a detailed syllabus and sample coursework material to the structures graduate advisor after starting with the structures program. That material will be reviewed and you’ll be notified of the approval decision in about 2 weeks.
Certificate Programs

Certificate programs are designed to provide students an edge over other students who have similar interests, but do not pursue a certificate program that compliments that interest. A graduate certification program represents an emphasis area within a particular field or it could be interdisciplinary and involve several fields. Two programs are of particular interest to structural engineering students and some of the courses required for those programs may be applied towards your engineering credit hour requirement.

Keep in mind that these programs are not offered through the Civil Engineering department, so for information please contact the specific department listed for the program directly. The information provided here is to serve as a preliminary source of information, but specific program requirements can only be determined through the department offering the certificate.

A. Certificate in Historic Preservation:

Certificate in Historic Preservation is open to students in any graduate degree program at Texas A&M University. The cross-disciplinary program in historic preservation draws on strong discipline-based academic programs that prepare graduates to further their career goals. The certificate assumes that historic preservation is a cross-disciplinary field, and the program is designed to ensure that students gain a sense of mutual respect for others in the field, and appropriate awareness, understanding, and ability within a specific body of knowledge.

Requirements

- Graduate students shall declare the intent to seek the Certificate by filing an application at the time they file a Degree Plan for their chosen degree.
- Certificate coursework must include ARCH 646: Historic Preservation Theory and Practice (3 credits),
- At least 12 additional credits of coursework with preservation content (equivalent to four courses). This requirement can sometimes be met through civil engineering coursework by choosing/defining a course project with preservation content.
- At least three (3) credits must be taken from courses outside of the student’s major department. As the required course ARCH 646 is outside civil engineering, this requirement is automatically satisfied by taking the one required course.
- The degree program must include a professional study, professional paper, thesis or dissertation with a historic preservation focus.

For additional information, see: the web-site at:
http://archone.tamu.edu/chc/education/links/certificate%20in%20hp.html
B. Certificate in Business:

Mays Business School offers a Certificate in Business to non-business graduate students at Texas A&M University. This certificate provides a general overview of the four major functional areas of business through a set of courses designed for non-business students. To complete the Certificate in Business, students must successfully complete the following four courses (12 credit hours). These courses do not have business course prerequisites:

- Accounting 640
- Finance 635 (prerequisite: ACCT 640)
- Management 655
- Marketing 621

If you have completed the undergraduate versions of any or all of these courses (business minor courses), then you must use a substitute for the course(s). The recommended substitutions are:

<table>
<thead>
<tr>
<th>COURSE</th>
<th>SUBSTITUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 640</td>
<td>ACCT 641, 642</td>
</tr>
<tr>
<td>FINC 635</td>
<td>FINC 629, 632, 642, 645</td>
</tr>
<tr>
<td>MGMT 655</td>
<td>MGMT 630</td>
</tr>
<tr>
<td>MKTG 621</td>
<td>MKTG 650, 656</td>
</tr>
</tbody>
</table>

Any two of the above courses may be used to satisfy elective coursework requirements at the masters level. Keep in mind that these courses fall under “Non-Technical Elective Coursework”, and the master degrees sallow a maximum of 6 semester hours of coursework in this category. So to complete the ME degree plus the Business Certificate, you would need to take a minimum of 36 hours.

Funding Opportunities
**Research Assistantships**

Research Assistantship (RA) positions are offered through individual faculty members. There is *no centralized list* of available positions. You'll need to set-up appointments to meet with them individually. You are *strongly* recommended to go through our department's web site to identify the different research areas each professor is working in before meeting with them.

**Teaching Assistantships**

New students are automatically considered for the small number of available positions based on their graduate application package. For all other students, a call for those interested in TA positions for future semesters will typically occur around the 10th or 11th week of the semester. Please wait for the email announcement and/or posted fliers announcing that TA applications.

If you are an international student, you must have satisfactorily passed the ELPE exam before being considered for a TA position.

**Fellowships**

Fellowships are typically awarded to incoming students by the structures faculty graduate advisors (Drs. Joe Bracci and Stefan Hurlebaus) and the Head of the Construction, Geotechnical and Structural Engineering Division (Dr. Peter Keating). All new students are automatically considered for available fellowships and no separate application form is required.

**Tuition Waivers & In-state Tuition**

*Tuition waivers do not exist at Texas A&M University.* For Research and Teaching Assistantship positions, your tuition will be paid by the Department or from the research project as a benefit of the position (note that student fees are not paid by the Department or by the research project and these fees are the responsibility of the student). Additionally, you may qualify for in-state tuition if you were awarded a Fellowship.

**Other job opportunities**

The faculty and graduate advisors do not coordinate nor know of any student worker positions in the department. If you are interested or need to pursue job opportunities beyond the TA/RA positions, you may want to look at: [http://jobforaggies.com.](http://jobforaggies.com.)
Additional Information
Full-Time Enrollment

Required credit hours to be certified as a full-time are:

Fall and Spring semesters: 9 hours
10-week Summer semester: 6 hours

Graduate students may be certified as full time with fewer than the required hours under special circumstances, including:

- During their final semester before graduation;
- Presence of a documented disability that mandates a reduced course load

These exceptions may or may not apply to a student’s eligibility for certain types of financial aid. Students who have questions about how exceptions to the full time enrollment requirements will affect their scholarships, loans, grants, etc., should confer with their financial aid counselor.

In most cases, international students are eligible for the same exceptions to full time requirements; however, all international students requesting an exception to full time requirements must have their request approved by International Student Services. Students who are not U.S. citizens, but who are permanent U.S. residents (VISA TYPE = IM) are not required to clear with ISS on enrollment exceptions.

A student who is enrolled in less than a full-time course of study at Texas A&M may be in jeopardy of:

- being out of compliance with the Bureau of Citizenship and Immigration Services (formerly INS) if enrolled at Texas A&M on a student visa;
- losing their Research or Teaching Assistantship position
- losing insurance coverage under his or her parent/guardian’s insurance policy;
- being placed on a loan repayment schedule by a lender or guarantor if the student is the recipient of Federal financial aid; and/or
- losing a scholarship if the guidelines for receiving the scholarship require full-time enrollment
**Mailboxes**

All graduate students will have a mailbox assigned to them on the 7th floor of the CE/TTI building. They usually get created for new students by the 2nd or 3rd week of classes. You must get in the habit of checking that mailbox on a regular basis, as sometimes critical information from the University and/or Department will be sent to your campus mailbox rather than your mailing address.

**Student Offices**

Offices for students who are Teaching Assistants are made through the main CE Graduate Advising Office for structural engineering students. You are responsible for contacting Ms. Laura Byrd and/or Chris Grunkemeyer for a desk assignment.

For students who become involved in research, desk assignments are centrally coordinated by the department. You must complete the Graduate Desk Registration form online to be considered for a desk assignment. The form is located at:

http://helpdesk.civil.tamu.edu/GraduateDeskRegistration.aspx

**Academic Probation**

Graduate students must maintain 3.0 GPR. This requirement includes courses in degree plan as well as all graduate courses taken. If a course is repeated, the last grade received will be the one utilized in GPR calculation. If a student’s GPR falls below 3.0, the student will need to meet with their graduate advisor to set out a plan to raise GPR to above 3.0 within one semester. Under extenuating circumstances, a second semester may be allowed for the student to raise their GPR.

Once a plan has been devised, it will be forwarded to the main CE Graduate Office. If the student fails to raise their GPR, they will be removed from the structural engineering graduate program.
Frequently Asked Questions
Degree Plans

• **What is the difference between the MS and MENG degree?**
  
  - MENG (Master of Engineering) - non-thesis option requiring 30 hours of graduate coursework credit
  
  - MS (Master of Science) - thesis option requiring 32 hours of graduate credit, but only 25 hours of coursework (remaining hours are research)

  Accordingly, the MS degree is more research-oriented and MENG is more course-oriented and geared towards professional practice.

• **Can I change my degree status once I’ve been admitted?**

  Yes, once admitted to graduate school, a student may file a Petition to change a degree status. The Petition must be signed by the department head and then filed with the Office of Graduate Studies (OGS) and approved. International students must check with the International Student Services Office to maintain legal status. Please read below for additional information on changing degree status for specific degrees.

• **Can I change my degree status once a degree plan is filed?**

  Yes, the student must file a Petition that is available electronically through the Office of Graduate Studies (OGS) website. The Petition will include any changes needed to the degree plan. The Petition must be signed by ALL committee members AND the department head. The Petition must subsequently be filed with the Office of Graduate Studies (OGS) and approved. Please read below for additional information on changing degree status for specific degrees.

• **I applied to the MENG program and now want to change to the MS program, is this possible and what is the procedure? I applied to the MS program and now want to change to the MENG program, is this possible and what is the procedure?**

  A student may file a Petition to change a degree status. The Petition must be signed by the department head and then filed with the Office of Graduate Studies (OGS) and approved. As long as you have not received financial support from the department in terms of an assistantship or a scholarship, switching between the MENG and MS degrees is straightforward prior to the submittal of your degree plan. In those cases, you simply submit your degree plan to the actual program you wish to pursue. After you have filed your degree plan or have been supported by the department through an assistantship, you will need to formally petition for a change of degree plan.
Petitions from an MENG to an MS degree will be approved by the faculty member accepting the student into their research program and willing to serve as their research advisor. No formal process is required other than the completion of the degree change form available at the Office of Graduate Studies (OGS) website.

Petitions from an MS to an MENG degree, in addition to the degree change form, require the following materials:

- A statement from the student describing why they feel they need to change degree programs. If the reason includes that the student could not find an advisor, then the committee will want to know that the student put in a good faith effort to find an advisor.
- A copy of their unofficial transcript, available via Howdy
- A listing of the support the student received during each semester they were enrolled. Include assistantships, fellowships, and scholarships. For each item, list the source of support and, if applicable, the supervisor.

**I am completing my MS degree and wish to continue onto the PhD. What is the procedure?**

Continuing on for a Ph.D. after the Master’s will be handled by the Graduate Admissions Committee. The committee will evaluate the application as they do the other applications to that degree program. Every student completing a graduate degree who wishes to continue to enroll in pursuit of another graduate degree should do so by filing an approved letter of intent with the Office of Graduate Studies (OGS). A student must use the letter of intent form that is available on the OGS website.

This form is to be submitted to the Civil Engineering Graduate Studies Office for review. Simultaneously, petitions for degree "upgrades" should additionally include the materials listed below. They should be submitted electronically to the structural engineering graduate advisors: Dr. Joe Bracci (bracci@civil.tamu.edu) and Dr. Stefan Hurlebaus (shurlebaus@civil.tamu.edu) for review by the structures admissions committee. The advising office will communicate the committee’s decision to the student.

- A statement of purpose for the desired degree program.
- A current vitae/resume and unofficial transcript.
- A letter of recommendation from your advisor, who should be a faculty member in structural engineering. If your advisor is from another specialty area in the department, then a second letter of recommendation from a structural engineering faculty member is required.
• **I have taken a graduate level course in which I received a C. This course is already present on my degree plan. Can I keep the course on the degree plan?**

Yes. The requirement for graduate students is to maintain a GPA of 3.0 on the degree plan. The intent of the degree plan is to identify the appropriate course of study for your chosen degree as determined by your advisor. Once the courses have been chosen and placed on an approved degree plan, it is the student's responsibility to maintain a 3.0.

It is NOT the intent of the degree plan to allow students to take courses and then, after taking the courses and receiving a grade, to choose whether or not the courses are to be included in the degree plan. A student is NOT to select for inclusion only those courses in the degree plan for which he/she may receive grades of A or B!

• **Can I change the courses on my degree plan once it is filed?**

Yes, the student can change the courses by filing a Petition. The Petition must be signed by **ALL** committee members AND the department head. The Petition must subsequently be filed with the Office of Graduate Studies (OGS) and approved.

• **Are leveling courses to be included in the degree plan even though they cannot be counted towards the required number of credits?**

Leveling courses MUST be listed at the bottom of the degree plan as prerequisites.

• **Who should be on my degree plan committee?**

MENG degree committee: a standard committee for all students

- Chair: Dr. Joe Bracci

MS and PhD degree committee: students must identify a professor **within the area of structural engineering** to serve as their research advisor, who serves as the chair. Other members will be selected based on discussions with the committee chair, with at least one member from outside the CVEN department. Note that for the MS at least one member must be a full-time structural engineering faculty member and that for the Ph.D. at least two members must be in the structural engineering faculty.

• **When should I file the degree plan?**

MENG degree: students should file within one month after starting their second semester of graduate coursework.
MS students: students should file within one month after starting their second semester of graduate coursework.

PhD students: students should file before their third semester of graduate coursework.

Keep in mind: the Office of Graduate Studies will block you from registration after completing 9 hours of graduate courses. If you do not register, you run the risk of losing your full-time student status. Also, the office frequently is overwhelmed as specific deadlines approach. If you wait until the last minute to submit your form(s), you may not be able to get them all signed on time, or run the risk of additional delays in OGS resulting in your being blocked from registration.

Assistantships

1. **There are two different types of courses for the summer, 5-week courses and 10-week courses. How can I register to satisfy the full-time status for my RA/TA?**

   To be considered a full-time student for the Summer, a student must register for a minimum of 6 credit hours in one of the two following ways:
   - 6 credit hours during the 10-week summer term OR
   - 3 credit hours during each 5-week summer term

   To hold an assistantship for the Spring and Fall semesters, the student needs to register for a minimum of 9 hours in order to be considered full-time.

   No other combinations are allowed.

2. **How do I apply for a Teaching Assistant (GAT) position?**

   All new students are automatically considered for a Graduate Teaching Assistantship. About the 10th week of the fall and spring semesters, if any positions are expected to be available then applications become available via email to structural engineering graduate students. In order to apply for a TA, complete the application and return it to the listed contact person.

3. **How do I apply for a Research Assistant (RA) position?**

   In order to apply for a RA, a student must contact the professors in structural engineering. The individual professors handle funding and will be able to inform students about openings for research positions.

4. **I am a foreign student and English is my second language. Can I apply for a TA? What is the requirement?**
International students whose native language is not English and who wish to apply for a TA position must fulfill an English proficiency requirement. The English Proficiency Certification (ELPE) is required before a graduate student is eligible to apply to serve as a TA or in any other position considered to be a teaching position.

It is best to meet this proficiency requirement early in a student's program. Contact the International Admissions Office at 979-845-1071 to arrange a test.

**Non-Civil Engineering Undergraduates**

1. **I do not have an undergraduate degree in civil engineering. Can I still be admitted into the structural engineering graduate program?**

   It is possible to be admitted to the graduate program in structural engineering without an undergraduate degree in CVEN. That is true for all our graduate degrees. Generally students who do not have an undergraduate degree in civil engineering are required to take numerous undergraduate “leveling” courses but not necessarily all those required for the undergraduate degree. For example, we currently have a student seeking a master’s degree in structures who came to our program with an undergraduate degree in mathematics.

   However, admission into the program is highly competitive and is particularly focused at a student’s technical abilities and potential chances to succeed in our engineering program. Your academic transcript must demonstrate your ability in math and science courses at a minimum in order to be a competitive applicant.

2. **Will I be able to become licensed as a professional engineer without an undergraduate degree in civil engineering if I complete the graduate structural engineering program?**

   You can be licensed in the state of Texas with only a graduate degree in civil engineering (CVEN) if the degree is obtained from a university that has a 4-year ABET accredited undergraduate program, which is the case for the civil engineering program at Texas A&M University. However, rules often change, so please the website of the Texas Board of Professional Engineers (http://engineers.texas.gov/) for the latest registration requirements. We cannot be responsible for licensure changes.

**Probation**

1. **What are the criteria for scholastic probation?**

   Graduate students are expected to maintain a Grade Point Ratio (GPR) equal to or better than 3.0 throughout the duration of their graduate study. This requirement applies to each of the...
cumulative and degree plan GPR. It is also a prerequisite for receiving a graduate degree in civil engineering.

2. **What happens after one semester on probation if my GPR is not back up to 3.0?**

   When a student's GPR (either cumulative or in the degree plan) falls below 3.0, the student is placed on probation by the department. Notifications are made by email or letter to the student, the advisor, and other pertinent offices within the university. The student must then meet with their graduate advisor and determine a plan to bring their GPR up to a 3.0 within one semester.

3. **What if the GPR requirement is not satisfied after one semester?**

   If after one semester on probation a student's cumulative or degree plan GPR is not back up to 3.0, the Office of Graduate Studies will be asked to remove the student from the graduate studies program. If extenuating circumstances exist, probation time may be extended for one more semester, allowing the student a final chance to meet the minimum GPR requirement.

4. **I took a course in which I got an ‘I’ for incomplete. After one semester, it becomes an F. Now I am on probation. What can I do to change the F back to a better grade?**

   It is the student's responsibility to complete the pending work within one semester of the course end. The student must complete the course work for which an I was received by submitting it to the professor pending his/her approval. The professor will then submit a grade change form. This change may or may not change the student's GPR, depending on the final grade received. The student will remain on probation until the registrar has changed the grade in the system.

5. **Does I (incomplete) in 691 (research) 684 (professional internship), or 692 (Professional study) become an F after one semester?**

   No, these courses are excluded from that rule.

6. **Does an I (incomplete) of 685 (problems) become an F after one semester?**

   Yes, if you receive an I in 685, it will turn to an F after one semester. The course 685 is a letter grade course and therefore is not excluded from the rule.