

GUIDELINES FOR M.S.E. DEGREE IN CIVIL ENGINEERING: CONCENTRATION IN STRUCTURAL ENGINEERING¹

General

An applicant for the M.S.E. degree must present the equivalent of an undergraduate civil engineering program as preparation. If the applicant's undergraduate degree is not in civil engineering, then some undergraduate prerequisite courses may be required. See the CEE Department Guidelines for additional information.

Coursework

A student pursuing a M.S.E. degree in Structural Engineering must complete at least 30 credit hours of acceptable graduate work. (This usually corresponds to 10 courses.) A thesis is not required. In satisfying the credit hour requirement, the following requirements must be satisfied:

- At least 15 of the credit hours must be in Civil and Environmental Engineering (CEE) courses.
- At least 12 credit hours must correspond to courses within the Structures concentration area. Acceptable courses are listed below. However, no more than 21 credit hours from the courses listed below can be counted toward the MSE degree. Among the 12 credit hours required, at least 3 should be at the 600 level.

CEE 510	Finite Element Methods	CEE 518	Fiber-Reinforced Cement Composites
CEE 511	Dynamics of Structures	CEE 611	Earthquake Engineering
CEE 512	Nonlinear Analysis of Structures	CEE 613	Metal Structural Members
CEE 513	Plastic Analysis and Design of Frames	CEE 614	Advanced Prestressed Concrete
CEE 514	Prestressed Concrete	CEE 615	Reinforced Concrete Members
CEE 515	Advanced Design of R/C Structures	CEE 616	Passive Control of Structural Systems
CEE 516	Bridge Structures	CEE 617	Random Vibrations
CEE 517	Reliability of Structures	CEE 619	Adv. Struct. Dynamics and Smart Structures
CEE 519	High-Perfor. Struct. Materials and Systems	CEE 910	Structural Engineering Research

- In addition to the minimum 12 credit hours of Structures courses, a student must enroll for a minimum of 1 and maximum of 2 credit hours of the CEE 812 Structural Engineering Graduate Seminar. Attendance of all structural engineering seminars scheduled during the period of study is mandatory and strict attendance records will be kept.
- A student must satisfactorily complete at least 4 credit hours of cognate courses related to the field of specialization, but offered outside the Civil and Environmental Engineering Department, to increase the intellectual breadth of the graduate education. Courses cross-listed with the Civil and Environmental Engineering Department may satisfy the cognate requirement provided that the course is in a subfield different from the student's own. Cognate courses must be passed with a B- or better (see Rackham BULLETIN for more information). The list of courses on page 2 can be used as a guide to satisfy the cognate course requirement. Courses other than those listed should be approved by the student's academic advisor in advance.
- The student must complete at least one course (minimum of 3 credit hours) in mathematics or math intensive studies, probability, statistics, or mathematical programming, beyond the minimum undergraduate requirements of the Civil and Environmental Engineering Department of The University of Michigan. A course used to satisfy this math requirement also can be used toward the 4 credit hour cognate requirement provided that it is taken outside the Civil and Environmental Engineering Department or is cross-listed with another department and is outside the student's subfield of study. Approved courses within the department (see dept. guidelines) can be used to satisfy the math requirement.
- No more than 6 credit hours of directed studies, seminars or research can be counted toward the 30-credit requirement. This covers credit hours received for CEE 910 and CEE 950.
- No more than 12 credit hours at the 400 level are acceptable. Of these 12 hours, a maximum of 9 hours can be in CEE courses. Structural engineering courses at the 400 level are not accepted for graduate credit unless approved in advance by the MSE graduate advisor in structural engineering.
- SUGS students are permitted to double count up to 6 credit hours, including CEE 413 and 415. However, students who double count 413 and 415 must take at least 3 structural engineering courses at the 500 level.
- A maximum of 6 graduate level semester hours (with a grade of B or better) can be transferred from other institutions approved by Rackham.

Grades

The grading system used for graduate studies is based on the following 4-point scale:

$$A+ = 4.3; A = 4; A- = 3.7; B+ = 3.3; B = 3.0; B- = 2.7; C+ = 2.3; C = 2; C- = 1.7$$

A minimum cumulative graduate grade point average (GPA) of 3 on this 4-point scale is required for all graduate courses taken for credit and applied toward the Master's Degree.

¹ For additional information on M.S.E. degree requirements, see the *Graduate Student Handbook* (prepared by the Horace H. Rackham School of Graduate Studies) and the CEE Department Guidelines. The *Graduate Student Handbook* is available on the World Wide Web at <http://www.rackham.umich.edu/>.

Diploma

To be considered for a master's degree diploma, a student must submit a formal application to the Office of Graduate Academic Records of the Graduate School. The deadline for the Graduate School to receive the degree application form is four weeks after the first day of classes in a full term and one week after the first day of classes in a half term. These dates can usually be found on the Rackham Graduate School web site (<http://www.rackham.umich.edu>).

Acceptable Cognate Courses for M.S.E. in Structural Engineering

Shown below is a partial list of courses that can be used to satisfy the advanced math course requirement for the CEE Department's M.S.E. degrees. In general, the math course should have a prerequisite of Math 215 or equivalent.

Math 404	Intermediate Differential Equations		
Math 412	Introduction to Modern Algebra	BioStat 553	Applied Biostatistics
Math 416	Theory of Algorithms		
Math 417	Matrix Algebra I		
Math 419	Linear Spaces and Matrix Theory		
		IOE 510	Linear Programming
Math 433	Intro. to Differential Geometry		
Math 450	Adv. Math for Engineers I		
Math 451	Adv. Calculus I		
Math 454	Boundary Value Prob. for PDE		
Math 462	Mathematical Models		
Math 471	Intro. to Numerical Methods		
Math 5XX	Any 500 level math course		

Shown below is a partial list of courses that may be used to satisfy the cognate course requirement for the CEE Department's M.S.E. degrees.

ME 400	Mechanical Engineering Analysis	Aero 416	Plates and Shells
ME 401	Statistical Quality Control and Design	Aero 513	Solid and Structural Mechanics I
ME 412	Advanced Strength of Materials	Aero 514	Solid and Structural Mechanics II
ME 515	Contact Mechanics	Aero 516	Mechanics of Composites
ME 501	Analytical Methods in Mechanics	Aero 518	Theory of Elastic Stability I
ME 502	Methods of Diff. Eqns. In Mechanics	Aero 565	Optimal Structural Design
ME 511	Theory of Solid Continua	Aero 611	Advanced Finite Elements
ME 519	Theory of Plasticity I		
ME 543	Analytical and Comp. Dynamics I	MSE 514	Composite Materials
ME 555	Design Optimization		
ME 558	Discrete Design Optimization		
ME 563	Time Series Modeling		
ME 564	Linear Systems Theory		
ME 605	Adv. Finite Element Methods in Mech.		
ME 619	Theory of Plasticity II		

There are many other courses in engineering, math, science, and architecture/urban planning that may satisfy the requirements for the non-math cognate course. (A cognate course must be at the 400 level or higher, must be related to the field of specialization, and must be listed in the Rackham Bulletin. Cognate courses must be passed with a B- or better to count towards the degree.) Such courses must be approved for cognate credit in advance by the student's academic advisor. Courses outside of engineering, math, science, and architecture/urban planning are generally not acceptable as cognate courses. Except as listed above, generally 400 level courses are not acceptable.

Examples of courses accepted in the past: UP 538, UP 594, UP 565

Checklist

The checklist below can be used to monitor your progress toward your M.S.E. degree.

Student Name: _____

	Requirement Description	Course Number	Course Description	Credits	Transfer √
1	Advanced Math				
2	Cognate				
3	CEE (Concentration Area)				
4	CEE (Concentration Area)				
5	CEE (Concentration Area)				
6	CEE (Concentration Area) 600 level				
7	CEE				
8	Open Choice				
9	Open Choice				
10	NOT Structures and NOT Cognate				
11	CEE 812 (Graduate seminar)				
	Extra				
	Extra				

Advisor Approval: _____ Date: _____