

GUIDELINES FOR M.S.E. DEGREE IN CIVIL ENGINEERING: CONCENTRATION IN STRUCTURES / MATERIALS 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 Structures/Materials 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 be within one concentration area (structures or materials). Acceptable courses in structures and materials 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.

** A superscript "S" denotes a structures course. A superscript "M" denotes a materials course.

CEE 510 ^S	Finite Element Methods	CEE 553 ^M	Advanced Concrete Materials
CEE 511 ^S	Dynamics of Structures	CEE 554 ^M	Materials in Engineering Design
CEE 512 ^S	Theory of Structures	CEE 611 ^S	Earthquake Engineering
CEE 513 ^S	Plastic Analysis and Design of Frames	CEE 613 ^S	Metal Structural Members
CEE 514 ^S	Prestressed Concrete	CEE 614 ^S	Advanced Prestressed Concrete
CEE 515 ^S	Advanced Design of R/C Structures	CEE 615 ^S	Reinforced Concrete Members
CEE 516 ^S	Bridge Structures	CEE 617 ^S	Random Vibrations
CEE 517 ^S	Reliability of Structures	CEE 650 ^M	Fracture and Micromechanics of Composites
CEE 518 ^S	Fiber-Reinforced Cement Composites	CEE 910 ^S	Structural Engineering Research
CEE 547 ^M	Soil Engineering and Pavement Systems	CEE 950 ^M	Materials Engineering Research
CEE 552 ^M	Bituminous and Cement Mixes for Construct.		

- A student must satisfactorily complete at least two graduate level courses (cognate courses), with a minimum of 2 credit hours each, in a department other than Civil and Environmental Engineering. One of these cognate courses must be an advanced mathematics course. 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. Courses cross-listed with CEE courses do not qualify as cognates.
- 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.
- 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 9-point scale:

A+ = 9; A = 8; A- = 7; B+ = 6; B = 5; B- = 4; C+ = 3; C = 2; C- = 1

A minimum cumulative graduate grade point average (GPA) of 5 on this 9-point scale is required for all graduate courses taken for credit and applied toward the Master's Degree.

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/>).

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/>.

Acceptable Cognate Courses for M.S.E. in Structures / Materials Engineering

Shown below is a partial list of courses that can be used to satisfy the advanced math cognate 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	Aero 452	Probabilistic Methods in Engineering
Math 412	Introduction to Modern Algebra	BioStat 553	Applied Biostatistics
Math 416	Theory of Algorithms	ChemE 507	Math. Modeling in Chemical Eng.
Math 417	Matrix Algebra I	ChemE 508	Applied Numerical Methods I
Math 419	Linear Spaces and Matrix Theory	IOE 472	Operations Research
Math 425	Intro. to Probability	IOE 510	Linear Programming
Math 433	Intro. to Differential Geometry	Stat 412	Intro. to Probability and Statistics
Math 450	Adv. Math for Engineers I	Stat 405	Introduction to Statistics
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 math-oriented courses that cannot be used to satisfy the advanced math cognate requirement. However, these courses can be used to satisfy the second cognate course requirement for the CEE Department's M.S.E. degrees.

ME 400	Mechanical Engineering Analysis	Aero 414	Structural Mechanics II
ME 401	Engineering Statistics for Manufact.	Aero 416	Theory of Plates and Shells
ME 501	Analytical Methods in Mechanics	Aero 510	Finite Elements – Introductory Level
ME 502	Methods of Diff. Eqns. In Mechanics	Aero 511	Finite Elements – Intermediate Level
ME 503	Math. Methods in Applied Mech.	Aero 514	Foundations of Solid Mechanics
ME 504	Principles of Variational Methods	Aero 516	Mechanics of Fibrous Composites
ME 505	Finite Element Methods	Aero 518	Theory of Elastic Stability I
ME 511	Theory of Solid Continua	Aero 552	Probability and Random Processes
ME 512	Theory of Elasticity	Aero 553	Stochastic Processes
ME 519	Theory of Plasticity I	Aero 611	Advanced Topics in Finite Element
ME 543	Analytical and Comp. Dynamics I	AM 412	Advanced Strength of Materials
ME 555	Design Optimization	AM 515	Contact Mechanics
ME 558	Discrete Design Optimization	AM 565	Optimal Structural Design
ME 563	Time Series Modeling	AM 618	Theory of Elastic Stability II
ME 564	Linear Systems Theory	AM 619	Theory of Plasticity II
ME 605	Adv. Finite Element Methods in Mech.	IOE 451	Engineering Economy
		MSE 514	Composite Materials

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 not be cross-listed with a CEE 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.) 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.

	Requirement Description	Course Number	Course Description	Credits	Transfer √
1	Cognate – 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 Struct./ Materials and NOT Cognate				
	Extra				
	Extra				