COLLEGE OF ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY OF MICHIGAN
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MASTER OF SCIENCE IN ENGINEERING (MSE) IN CIVIL ENGINEERING REQUIREMENTS AND PROCEDURES

The purpose of the MSE degree in Civil Engineering at the University of Michigan (U-M) is to permit a higher level of specialization than that achieved in a Civil Engineering undergraduate degree. These guidelines have been developed to assist graduate students working toward the MSE degree in Civil Engineering in planning a program of study that meets the requirements of that degree. Each student is responsible for planning such a study program, with the guidance and approval of the faculty advisor from their area of specialization. Faculty advisors are listed in Appendix 1.

1. REGULATIONS

The basic requirements for the MSE degree are established by the Horace H. Rackham School of Graduate Studies (referred to herein as the Graduate School). The faculty of the Department of Civil and Environmental Engineering has adopted certain additional requirements. The requirements, as they relate to the MSE in Civil Engineering degree, are described in these guidelines.

Each MSE student must take personal responsibility for seeing that all requirements are met prior to the graduation deadline specified by the Rackham Graduate School. These deadlines may be found at https://rackham.umich.edu/navigating-your-degree/apply-for-graduation/.

If special decisions or actions are needed, they should be initiated by the student in consultation with their specialization's faculty advisor and then referred to the CEE Masters Chair if necessary.

2. PROGRAM INFORMATION

2.1. Admission and Prerequisites

To be granted admission to the MSE in Civil Engineering degree program, an applicant normally holds a BSE degree in Civil Engineering and has attained an undergraduate grade point average (GPA) of at least 3.3/4.0. Students holding BS degrees in another engineering discipline, in architecture, or in the physical, chemical or biological sciences, may be admitted if they have achieved the technical background necessary to pursue advanced work in Civil Engineering. This background must include three semesters of calculus, one semester of ordinary differential equations, and two semesters of calculus-based physics. Courses at U-M which provide this background are listed below:

Prerequisite topic	UM courses
Calculus	MATH 115, 116, 215
Ordinary Differential Equations	MATH 216
Calculus-Based Physics	PHYSICS 140, 240

It is expected that incoming students will also have some prior experience with computer programming, and problem-solving using computers.

For each specialization area, additional prerequisites must be satisfied in order to take graduate courses pertaining to the specialization, as detailed in Appendix 1. Ideally, students should complete these undergraduate course requirements prior to applying. However, in special circumstances, and with the written approval of the faculty specialization advisor as well as the CEE Masters Chair, an admitted student with some prerequisite deficiencies may take the appropriate undergraduate courses *in the first offering of the course after*

enrollment for the MSE degree. It is necessary to obtain a grade of "B" or better in each of these courses. Otherwise it must be retaken. No prerequisite courses below the 400 level may be used for graduate credit. Prerequisite courses at the 400 level may be counted for graduate credit.

2.2. General Requirements and Policies

2.2.1. Credit Hours

A minimum of 30 credit hours of approved graduate work must be completed for the MSE in Civil Engineering degree. According to the Graduate School guidelines, a student must register for a minimum of nine credit hours per semester to be considered a full-time student. Nine to twelve credit hours per term is the usual full-time graduate course load. Graduate students with research or teaching appointments must carry a minimum of six credit hours per term.

Note that some U.S. government agencies, such as the Veterans Administration and the U.S. Citizenship and Immigration Services, may require a student to be enrolled for a different minimum number of credit hours to be considered a full-time student. International students must be enrolled full-time under requirements set by the U.S. Citizenship and Immigration Services, and on F-1 or J-1 visas should consult the International Center with any questions concerning enrollment, course registration, and visa status. International students who wish to be registered less than full-time must obtain permission in advance from the International Center or risk compromising their visa status.

2.2.2. Grades and GPA

A grade point average (GPA) of at least 3.0 must be maintained for graduate level courses taken while enrolled in the Graduate School, and for the 30 credit hours used to fulfill the credit-hour requirement. Failure to do so will result in being placed on probation. A course in which a grade lower than C is obtained may not be counted toward the satisfaction of any degree requirements, but it is considered in the computation of the overall GPA.

2.2.3. Thesis or non-thesis research

A thesis is not required, but up to 6 credit hours of research can be used toward the 30-credit hour degree requirement by electing the following independent study courses:

- CEE 910: Structural Engineering Research
- CEE 921: Hydraulic and Hydrological Engineering Research
- CEE 630: Directed Studies in Construction Engineering
- CEE 946: Soil Mechanics Research
- CEE 950: Structural Materials Research
- CEE 955: Transportation Systems Engineering Research
- CEE 970: Intelligent Systems Engineering Research

To register for any of these, the student must have a faculty sponsor and have worked out the details of what will be accomplished with that faculty member.

2.2.4. Language

Proficiency in the English language, both spoken and written, is expected. There is no requirement for proficiency in any other language. MSE applicants whose native language is not English must demonstrate English proficiency by following Graduate School guidelines (https://rackham.umich.edu/admissions/applying/tests/).

2.2.5. Residency Requirements

The Graduate School residency requirements are satisfied by full-time students being enrolled for two or more semesters. Students pursuing the MSE in Civil Engineering degree on a part-time basis should become familiar with special requirements relating to part-time enrollment. See the website of the Graduate School at: https://rackham.umich.edu/policy/section5/

2.2.6. Time Limit

A student must complete all work within a period of five consecutive years after first enrollment in the Graduate School.

2.2.7. Transfer Credits

The Graduate School guidelines permit transfer of up to half of the 30 credit hours required for the MSE in Civil Engineering degree from inter-university and intra-university sources combined, according to the following rules:

Graduate Credit

A maximum of 6 credit hours of graduate credit may be transferred from another institution. These must be approved graduate-level courses completed while enrolled in a degree program with a grade of B or better from an accredited institution approved by the Graduate School. Considerations of credit transfer will be made only upon written application of the student to the Graduate School through the Department of Civil and Environmental Engineering, and only after the student has established an overall graduate grade point average of B or better in resident work. Courses cannot be transferred for credit if already applied toward another degree, or if taken more than five years before the beginning of graduate study at U-M .

Pre-graduate Credit

Credit for courses taken by the student with a grade of B or better earned while an undergraduate in the U-M College of Engineering may be included in the student's graduate study program subject to the following: (1) credit was not used to meet any bachelor's degree requirement (including minors), (2) credit was earned no more than two years before formal admission to the Graduate School and (3) credit was earned in courses approved for graduate credit by the Graduate School. The student may request the transfer of such credits through the Department of Civil and Environmental Engineering after they have established an overall graduate grade point average of B or better in resident work.

2.2.8: Sequential Undergraduate-Graduate Studies (SUGS)

SUGS students with undergraduate specialization in any area of CEE may pursue an MSE degree in Civil Engineering. SUGS students are permitted to double count up to 6 credit hours, provided that (1) these credit hours are obtained with courses approved for graduate credit by the Graduate School, for which the student has received a grade of B or better, and (s) that they satisfy the requirements of the Program of Study as indicated in Section 3.3.

2.2.9: Diploma

To be considered and to be formally awarded the MSE in Civil Engineering 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/.

2.3. Program of Study

Students need to meet with the faculty advisor for their area of specialization to plan a program of study prior to starting their first semester of coursework. (The list of faculty advisors for each area of specialization can

be found on the first page of this document.) Following this meeting, each student must submit (via email) a Program of Study Form (Appendix 2) to the CEE Student Services (CEE-StudentServices@umich.edu) for approval before the end of the second week of the student's first semester of enrollment. Any subsequent changes to the study plan must be approved by the faculty advisor, and the Program of Study Form must be re-submitted before the alternate coursework is completed.

The Program of Study will vary for each student, depending on their interests and the courses being offered in a given year. However, each Program of Study must meet the following requirements:

- A minimum of 18 credit hours of the total 30 credit hours required for the MSE in Civil Engineering must be courses offered by the Department of Civil and Environmental Engineering.

- A minimum of 12 credit hours of the total 30 credit hours required for the MSE. in Civil Engineering must be from the "core" course list of ONE area of specialization. Core courses associated with each area of specialization are listed in Appendix 1. If a student completed coursework in a prior degree program which is equivalent to one of the core courses in their specialization area, and obtained a grade of B or better, this course may be counted toward the completion of their core requirement.

- A minimum of 6 credit hours of the total 30 credit hours required for the MSE in Civil Engineering must be from the "specialization elective" course list of the student's chosen area of specialization. Specialization elective courses are listed in Appendix 1. **If a student takes more than 12 credits of coursework from the specialization core, these credits automatically count toward the specialization elective requirement.** If a student previously completed coursework equivalent to one of the elective courses in their specialization area, and obtained a grade of B or better, this course may be counted toward the completion of their elective requirement.

- Up to 6 credit hours of research may be applied toward the degree. Students electing to do so must first find a faculty sponsor who will oversee the research. The student and faculty member must then work out the details of what will be accomplished, and decide on the number of credits. The student must then enroll in one of the research courses listed in Section 3.2.3. When enrolling, this student should choose the supervising faculty member's sub-section of the research course.

- Students may count at most 2 credits of seminar toward their degree. Furthermore, all students specializing in Structural Engineering, Geotechnical Engineering, Construction Engineering and Management, and Transportation Engineering must enroll in at least one seminar course corresponding to their specialization. These courses are:

    - CEE 812: Structural Engineering Graduate Seminar
    - CEE 830: Construction Engineering and Management Seminar
    - CEE 840: Geotechnical Engineering Seminar
    - CEE 8xx: Transportation Engineering Seminar

- Beyond the 12 credits of specialization-core, 6 credits of specialization-electives, and required seminar (for some specializations), the remainder of the 30 credits of coursework toward the MSE degree in Civil Engineering can be fulfilled by any graduate courses in the areas of Engineering, Computer Science, Mathematics, Probability, Statistics, Physics, Chemistry, Biology, Architecture, or Business, subject to advisor approval.

- No more than 12 credits at the 400 level listed in the bulletin of the Rackham School of Graduate Studies can be counted toward the MSE degree in Civil Engineering. Of these 12 hours, a maximum of 9 hours can be courses offered by the Department of Civil and Environmental Engineering.

Appendix 1: Prerequisites, core courses, and specialization elective courses

Construction Engineering & Management Faculty Advisor: C. Menassa		
Prerequisites	Specialization Core	Specialization Elective
● CEE 312: Structural Engineering ● CEE 345: Geotechnical Engineering ● CEE 331: Construction Management ● CEE 351: Civil Engineering Materials	● CEE 531: Construction Cost Engineering ● CEE 532: Advanced Construction Management ● CEE 536: Project Planning, Scheduling and Control ● CEE 530: Construction Professional Practice	● CEE 435: Building Information Modeling ● CEE 504: Engineering Economics and Finance ● CEE 533: Engineering Process Modeling and Risk Analysis ● CEE 534: Construction Engineering, Equipment, and Methods ● CEE 537: Construction of Buildings ● CEE 538: Computer-Aided Project Management ● CEE 539: Modern Construction Management ● CEE 555: Sustainability of Civil Infrastructure Systems ● CEE 631: Construction Decisions Under Uncertainty

Suggested General Electives
The following courses are commonly taken by CE students specializing in Construction Engineering & Management:

- IOE 510 Linear Programming
- Math 450 Advanced Mathematics for Engineers
- Stat 412 Introduction to Probability and Statistics
- EECS 442 Computer Vision
- EECS 551 Mathematical Methods for Signal Processing
- EECS 556 Image Processing
- EECS 568 Mobile Robotics:Methods and Algorithms
- ACC 471 Accounting Principles
- ACC 551 Principles of Managerial Accounting
- FIN 425 Entrepreneurial Finance
- FIN 503 Financial Management
- FIN 563 Real Estate Development in Practice
- MO 414 Managing Change
- MO 412 Negotiation Strategy
- BL 582 Real Estate Law

Geotechnical Engineering Faculty Advisor: F. Garcia		
Prerequisites	Specialization Core	Specialization Elective
● CEE 345: Geotechnical Engineering	● CEE 540: Advanced Soil Mechanics ● CEE 543: Numerical Modeling in Geotechnical Engineering ● CEE 545: Foundation Engineering ● CEE 546: Slopes, Dams and Retaining Structures ● CEE 548: Geotechnical Earthquake Engineering	● CEE 428: Groundwater Hydrology ● CEE 446: Engineering Geology & Site Characterization ● CEE 510: Finite Element Methods in Solid and Structural Mechanics ● CEE 535: Excavation and Tunneling ● CEE 542: Soil and Site Improvement ● CEE 544: Rock Mechanics ● CEE 547: Soils Engineering and Pavement Systems ● CEE 549: Geoenvironmental Engineering

Suggested General Electives
The following courses are commonly taken by CE students specializing in Geotechnical Engineering::

- CEE 421: Hydrology and Floodplain Hydraulics
- CEE 504: Engineering Economics and Finance
- CEE 509: Theory of Elasticity
- CEE 511: Dynamics of Structures
- CEE 575 Sensing for civil infrastructure systems
- EARTH 408: Introduction to GIS in Earth Sciences
- EARTH 420: Introduction to Earth Physics
- EARTH 442: Earth Surface Processes and Soils
- EARTH 467: Stratigraphy and Basin Analysis
- EARTH 468: Data and Models
- EARTH 483: Geophysics/Seismology
- EARTH 525: Tectonophysics
- EARTH: Earthquakes & Faults
- EECS 442: Computer Vision
- EECS 556: Image Processing
- IOE 561: Risk analysis
- MATH 450: Advanced Mathematics for Engineers
- MECHENG: 412 Advanced Strength of Materials
- NAVARCH 551: Offshore Engineering 1
- STAT 412: Introduction to Probability and Statistics

Hydraulics and Hydrologic Engineering Faculty Advisor: J. Bricker		
Prerequisites	Specialization Core	Specialization Elective
● CEE 325: Fluid Mechanics ● CEE 421: Hydrology and Floodplain Hydraulics	● CEE 428: Groundwater Hydrology ● CEE 501: Tsunamis, Hurricanes and Floods ● CEE 520: Physical Processes of Land-Surface Hydrology ● CEE 521: Flow in Open Channels ● CEE 522: Sediment Transport ● CEE 524: Restoration Fundamentals and Practice in Aquatic Systems ● CEE 525: Environmental Turbulence ● CEE 526: Design of Hydraulic Systems ● CEE 527: Coastal Hydraulics ● CEE 590: Stream, Lake, and Estuary Analysis ● CEE 591: Environmental Fluid Mechanics	● MECHENG 520: Advanced Fluid Mechanics 1 ● MECHENG 521: Advanced Fluid Mechanics 2 ● MECHENG 523 (AEROSP 523): Computational Fluid Dynamics 1 ● MECHENG 624 or AEROSP 525: Turbulent Flow ● CEE 545: Foundation Engineering ● CEE 546 Slopes, Dams and Retaining Structures ● CEE 510: Finite Element Methods in Solid and Structural Mechanics ● CEE 511: Dynamics of Structures ● CEE 573: Data analysis in CEE

Suggested General Electives

The following courses are commonly taken by CE students specializing in Hydraulics & Hydrologic Engineering::

- EAS 520/521 (Fluvial ecosystems and lab)
- CEE 510 Finite Element Methods
- CEE 517 Reliability of Structures
- CEE 537 Construction of Buildings
- CEE 540 Advanced Soil Mechanics
- CEE 542 Soil and Site Improvement
- CEE 543 Numerical modeling in geotechnical engineering
- CEE 553 Infrastructure systems optimization
- CEE 555 Sustainability of civil infrastructure systems
- CEE 571 Linear Systems Theory
- CEE 575 Sensing for civil infrastructure systems
- IOE 561 Risk analysis
- CLIMATE 421/ EARTH 421 Introduction to Physical Oceanography
- CLIMATE 555/ SPACE 555 Spectral Methods
- NAVARCH 520 Intermediate Hydrodynamics
- NAVARCH 523 Numerical Marine Hydrodynamics
- NAVARCH 551 Offshore Engineering 1
- EAS 520 Fluvial Ecosystems
- EAS 531 Principles of GIS
- EAS 541 Remote Sensing
- EAS 558 Water Policy and Politics
- EAS 574 Sustainable Energy Systems
- URP 542 Environmental Planning

- URP 520 Introduction to Geographic Information Systems

Intelligent Systems Faculty Advisor: J. Scruggs		
Prerequisites	Specialization Core	Specialization Elective
● CEE 303: Numerical Methods in Civil Engineering ● CEE 373: Probability and Statistical Methods	● CEE 572: Dynamics of Infrastructure Systems ● CEE 575: Sensing for Civil Infrastructure Systems ● CEE 553: Infrastructure Systems Optimization ● CEE 571: Linear System Theory	● CEE554: Data Mining in Transportation ● CEE 573: Data Analysis in Civil and Env. Engineering ● CEE 576: Stochastic Systems ● EECS460: Control Systems Analysis and Design ● EECS 501: Prob. and Random Processes ● IOE 574: Simulation Design and Analysis ● IOE 651: Risk Analysis 1

Suggested General Electives:
Students specializing in Intelligent Systems are strongly encouraged to include several core classes from one of the other specializations in their programs of study, as general electives. In addition, the following courses from other departments are commonly taken by CE students specializing in Intelligent Systems:

- AEROSP 566: Data Analysis and System Identification
- AEROSP 567: Inference, Estimation, and Learning
- AEROSP 577: Data-driven & Reduced Complexity Modeling
- AEROSP 580: Linear Feedback Control Systems
- EECS 502: Stochastic Processes
- EECS 544: Analysis of Societal Networks
- EECS 550: Information Theory
- EECS 551: Matrix Methods for Signal Processing, Data Analysis and Machine Learning
- EECS 558. Stochastic Control
- EECS 561 (MECHENG 561): Design of Digital Control Systems
- EECS 562: (AEROSP 551). Nonlinear Systems and Control
- EECS 563: Hybrid Systems, Analysis, and Control
- EECS 564: Estimation, Filtering, and Detection
- EECS 565: Linear Feedback Control Systems
- EECS 566: Discrete Event Systems
- EECS 592: Foundations of Artificial Intelligence
- EECS 600 (IOE 600). Function Space Methods in System Theory
- IOE 510 (Math 561) (OMS 518): Linear Programming I
- IOE 511 (Math 562): Continuous Optimization Methods
- IOE 512: Dynamic Programming
- IOE 517: Game Theory and Operations Applications
- MECHENG 461: Automatic Control
- MECHENG 548: Applied Nonlinear Dynamics
- MECHENG 552: Mechatronic Systems Design
- MECHENG 555: Design Optimization
- NAVARCH 583: Adaptive Control

Natural Hazards, Risk, and Resilience Faculty Advisor: S. Guikema		
Prerequisites	Specialization Core	Specialization Elective
• CEE 373: Probability and Statistical Methods	• CEE 501: Modeling Regional Disaster Impacts • IOE 561: Risk Analysis • CEE 554: Data Mining in Transportation • CEE 501: Spatial Data Analytics • EAS 567: Social Vulnerability and Adaptation to Environmental Change	• CEE 548. Geotechnical Earthquake Engineering • CEE 553. Infrastructure Systems Optimization • CEE 573. Data Analysis in Civil and Environmental Engineering • IOE 574: Simulation Modeling • CEE 611: Performance- Based Earthquake Engineering • CEE 576 (MECHENG 549). Stochastic Systems • CEE527: Floods, Tsunamis, Hurricanes • CEE421: Hydrology and Floodplain Hydraulics • CEE 517: Structural Reliability

Suggested General Electives

The following courses are commonly taken by CE students specializing in Natural Hazards, Risk, and Resilience:

- CEE 567. (ESENG 567) Energy Infrastructure Systems
- CEE 568: Water and Sanitation (WASH) Design and Practice
- EARTH 408: Introduction to GIS in Earth Sciences
- EAS 531: Principles of GIS
- EAS 541: Remote Sensing
- EAS 635.001 - Multivariate Stats
- SI 536/URP 353: Introduction to Urban Informatics
- SI 537: Crisis Informatics
- CEE 575. Sensing for Civil Infrastructure Systems
- CEE 526. Design of Hydraulic Systems
- CEE 546. Slopes, Dams, and Retaining Structures
- CEE 575. Sensors, Data, and Automation
- EAS 541: Remote Sensing of Environment
- TCHNCLCM 610: Technical and Professional Communication For Graduate Students
- EARTH 526: Earthquake Hazard and Fault Mechanics
- SI 501: Contextual Inquiry and Consulting Foundations
- SI 547: Engaging with Communities (NOTE: SI 501 is a prerequisite)
- CEE 504. Engineering Economics and Finance
- CEE 520. Physical Processes of Land-Surface Hydrology
- CEE 521. Flow in Open Channels
- CLIMATE 530. Using Climate-Change Knowledge in Planning and Design
- CLIMATE 588. Regional Scale Climate
- CLIMATE 591. Climate Practicum I
- CLIMATE 592. Climate Practicum II

Structural and Materials Engineering Faculty Advisor: S. El-Tawil		
Prerequisites	Specialization Core	Specialization Elective
● CEE 312: Structural Engineering ● CEE 412: Matrix Structural Analysis[1] ● CEE 413: Design of Metallic Structures[1] – or – CEE 415: Design of Concrete Structures[1] ● CEE 351: Civil Engineering Materials[2] ● CEE 345: Geotechnical Engineering[3]	● CEE 510: Finite Element Methods ● CEE 511: Dynamics of Structures ● CEE 512: Nonlinear Analysis of Structures ● CEE 513: Plastic Analysis and Design of Frames ● CEE 514: Prestressed Concrete ● CEE 515: Advanced Design of R/C Structures ● CEE 517: Reliability of Structures ● CEE 547: Soils Engineering and Pavement Systems ● CEE 611: Performance Based Earthquake Engineering	● CEE 516: Bridge Structures ● CEE 518: Deployable and Reconfigurable Structures ● CEE 545: Foundation Engineering ● CEE 572: Dynamics of Infrastructure Systems ● CEE 575: Sensing for Civil Infrastructure Systems ● CEE 616: Passive Control of Structural Systems ● CEE 6xx: Structural Fire Engineering ● CEE 650: Adv. Fiber R/C for Sustainable Infrastructure ● CEE 554: Data Mining in Transportation ● IOE 574: Simulation Design and Analysis ● IOE 651: Risk Analysis 1 ● CEE 553: Infrastructure Systems Optimization ● CEE 573: Data Analysis in CEE

[1] Students taking these prerequisite courses during their MSE degree may count them toward the 30-credit degree, as general electives, provided that only 9 credit hours of 400-level CEE courses are counted towards their degree.
[2] Only required for students electing to take CEE 547 or CEE 650
[3] Only required for students electing to take CEE 545

Suggested General Electives
The following courses are commonly taken by CE students specializing in Structural and Materials Engineering:

- CEE 435: Building Information Modeling
- CEE 509: Theory of Elasticity
- CEE 546: Slopes, Dams and Retaining Structures
- CEE 547: Soils Engineering and Pavement Systems
- CEE 548: Geotechnical Earthquake Engineering
- CEE 555: Sustainability of Civil Infrastructure Systems
- CEE 571: Linear System Theory
- ARCH: 524 Surface Structures
- ARCH: 544 Wood Structures
- ARCH: 571 Digital Fabrication
- AERO: 416 Plates and Shells
- AERO: 516 Mechanics of Composites
- AERO: 518 Theory of Elastic Stability I

- MSE: 514 Composite Materials
- MECHENG: 412 Advanced Strength of Materials
- MECHENG: 511 Theory of Solid Continua
- MECHENG: 555 Design Optimization
- MECHENG: 605 Adv. Finite Element Methods in Mech.

Transportation Systems Engineering **Faculty Advisor: N. Masoud**		
Prerequisites	Specialization Core	Specialization Elective
● CEE 303: Numerical Methods in Civil Engineering ● CEE 373: Probability and Statistical Methods ● CEE 450: Introduction to Transportation Engineering	● CEE 551: Traffic Science ● CEE 552: Travel Behavior Analysis and Forecasting ● CEE 553: Infrastructure Systems Optimization ● CEE 554: Data Mining in Transportation ● CEE 557: Large-scale Transportation Systems Optimization ● CEE 559: Transportation Network Modeling	● CEE 572: Dynamics of Infrastructure Systems ● CEE 577: Dynamics and Control of Connected Vehicles ● CEE 547: Soil Engineering and Pavement Systems ● URP 560: Transportation and Land Use Planning ● URP 561: Public Policy and Transportation ● AEROSP 740: Air Transportation Systems ● CEE 575: Sensing for Civil Infrastructure Systems

Suggested General Electives
The following courses are commonly taken by CE students specializing in Transportation Engineering:

- CEE 571: Linear System Theory
- CEE 576: Stochastic Systems
- EECS 460: Control Systems Analysis and Design
- EECS 592: Foundations of Artificial Intelligence
- IOE 511 (Math 562): Continuous Optimization Methods
- IOE 512: Dynamic Programming
- IOE 515: Stochastic Processes
- IOE 517: Game Theory and Operations Applications
- IOE 561: Risk Analysis
- IOE 610 (Math 660). Linear Programming II
- IOE 611 (Math 663). Nonlinear Programming
- IOE 612. Network Flows
- IOE 614. Integer Programming

Appendix 2: Plan of Study

Student's Name: _____

Specialization: _____

	Semester				Credit Hours
	F___	W___	F___	W___	
Specialization core (min 12 credit hours)					
1.					
2.					
3.					
4.					
Specialization electives (min 6 credit hours)					
1.					
2.					
3.					
General electives & seminars					
1.					
2.					
3.					
4.					
5.					

- ❑ At least 18 credit hours of CEE courses.
- ❑ No more than 9 credit hours of 400-level CEE courses.
- ❑ No more than 12 credit hours of 400-level courses in total.
- ❑ No more than 2 credit hours of seminar

- ❑ Check here if you are a SUGS student. Please attach your approved SUGS form.

Faculty Advisor: _____ (signature) Date: _____