Request for Graduate Addition, Deletion, or Change of a Major or Degree

NOTE: Before you submit a request for a new Major or Degree, you must submit an INTENT TO PLAN form. Only after the INTENT TO PLAN goes through the approval process are you ready to submit this request for a new Major or Degree. For detailed information on new programs please see: http://wvhepcdoc.wvnet.edu/resources/133-11.pdf.

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one PDF copy without signatures to the Graduate Council Chair.
3. ***The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.***

College: CITE

Dept/Division: Engineering

Contact Person: Eldon R. Larsen

Phone: 304-746-2047

Degree Program: M.S.E.

Check action requested: ☐ Addition ☐ Deletion ☒ Change

Effective Term/Year: Fall 20 ☐ Spring 20 ☐ Summer 20 17

Information on the following pages must be completed before signatures are obtained.

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head _____	Date _____
College Curriculum Chair _____	Date _____
College Dean _____	Date _____
Graduate Council Chair _____	Date _____
Provost/VP Academic Affairs _____	Date _____
Presidential Approval _____	Date _____
Board of Governors Approval _____	Date _____

Request for Graduate Addition, Deletion, or Change of a Major or Degree-Page 2

Please provide a rationale for addition, deletion, change: (May attach separate page if needed)

In order to make our requirements more internally consistent with each other, with respect to credit-hour workload, we are reducing the coursework-only option to 30 credit hours. Thus, the coursework-only option will require 30 credit hours of regular courses with a comprehensive assessment exam. The other two options ~~with~~ will stay as they currently are, being (a) 27 credit hours plus a 3 credit-hour Comprehensive Project, and (b) 24 credit hours plus a 6 credit-hour thesis. All three options will thus require 30 credit hours of work, and will be internally consistent, and fair to our students. Editorially, the order for the options for each major has been rearranged to list the coursework-only option first for each major.

Please describe any changes in curriculum:
List course number, title, credit hours. Note whether each course is required or optional. Enter NONE if no change. (May attach separate page if needed)

See Attachment

1. ADDITIONAL RESOURCE REQUIREMENTS: If your program requires additional faculty, equipment or specialized materials to ADD or CHANGE this major or degree, attach an estimate of the time and money required to secure these items.
NOTE: Approval of this form does not imply approval for additional resources. Enter NONE if not applicable.

None

2. NON-DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the request and any response received from them. Enter NONE if not applicable.

None

For catalog changes as a result of the above actions, please fill in the following pages.

Request for Graduate Addition, Deletion, or Change of a Major or Degree-Page 3

3. *Current* Catalog Description

Insert the *Current* Catalog Description and page number from the latest catalog for entries you would like to change.
(May attach separate page if needed)

See Attachment

4. *Edits* to the Current Description

Attach a PDF copy of the current catalog description prepared in MS WORD with strikethroughs to mark proposed deletions and use the highlight function to indicate proposed new text.

Request for Graduate Addition, Deletion, or Change of a Major or Degree-Page 4

5. *New* Catalog Description

Insert a 'clean' copy of your proposed description, i.e., no strikethroughs or highlighting included. This should be what you are proposing for the new description. (May attach separate page if needed)

See Attachment

Request for Graduate Addition, Deletion, or Change of a Major or Degree-Page 5

Please insert in the text box below your change summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:
Major or Degree:
Type of Change: *(addition, deletion, change)*
Rationale:

Department: Engineering

Major or Degree: All majors (Engineering Management; Environmental Engineering; Transportation and Infrastructure Engineering

Type of Change: (addition, deletion, change) Change

Rationale: In order to make our requirements more internally consistent with each other, with respect to credit-hour workload, we are reducing the coursework-only option to 30 credit hours. Thus, the coursework-only option will require 30 credit hours of regular courses with a comprehensive assessment exam. The other two options with stay as they currently are, being (a) 27 credit hours plus a 3 credit-hour Comprehensive Project, and (b) 24 credit hours plus a 6 credit-hour thesis. All three options will thus require 30 credit hours of work, and will be internally consistent, and fair to our students. Editorially, the order for the options for each major has been rearranged to list the coursework-only option first for each major.

CURRENT CATALOG DESCRIPTION

ENGINEERING, M.S.

Majors

Engineering Management
Environmental Engineering
Transportation and Infrastructure Engineering.

Program Description

The M.S. in Engineering (M.S.E.) program is an interdisciplinary engineering program designed to meet the specific needs of engineers employed in industry, government, and consulting, as well as those desiring a traditional research-based graduate degree. The program offers a broad core curriculum with opportunities for concentrated study in three majors: Engineering Management, Environmental Engineering, and Transportation and Infrastructure Engineering.

Admission Requirements

Applicants should follow the admissions process described in this catalog or at the Graduate Admissions website: *www.marshall.edu/graduate/admissions/how-to-apply-for-admission*. Each applicant for admission to the M.S. in Engineering degree program must have an undergraduate engineering degree from either an accredited ABET curriculum or an internationally recognized program and meet one of the following (A, B, or C) admission requirement options:

A. Pass the PE exam, or
B. Have an undergraduate cumulative GPA of 3.00 or greater, or
C. Have an undergraduate cumulative GPA of 2.50 or greater. and satisfy at least two of the following:
   (1) Pass the FE exam;
   (2) Verbal GRE score of at least 145;
   (3) quantitative GRE score at least 150; and/or
   (4) analytical writing GRE score at least 3.0.

Additionally, to be considered for admission, international students must have an iBT TOEFL score of at least 85. or a Paper-Based TOEFL score of at least 527.

Students who do not meet admission requirement options A, B, or C arc welcome to apply, and their applications will be considered for admission on a case-by-case basis. The program admission recommendation will be decided by the M.S.E. degree program coordinator based on a combination of GRE scores and level of performance in undergraduate engineering coursework. Applicants who do not meet the above criteria but who do have an undergraduate engineering degree are welcome to apply as non-degree seeking students and take courses toward an M.S.E. degree. If a non-degree seeking student has at least a minimum cumulative graduate GPA of 3.30 in his or her first 9 credit hours of CITE M.S.E. courses, that student may re-apply to the university to be considered for admission to the M.S.E. degree program.

Eligibility to take the PE exam is based primarily on completion of an ABET-accredited undergraduate engineering degree in most states. Completion of a M.S.E. graduate degree at an institution with an ABET-accredited undergraduate degree does not fulfill that requirement to take the PE exam.

Degree Requirements

Each degree candidate is required to complete at least 30-33 graduate credit hours, depending on the option chosen below (project, thesis, or coursework only), with a cumulative Grade Point Average of 3.0 for the courses included in the student's Plan of Study. At least one-half of the minimum required hours for the degree must be earned in classes numbered 600 or above.

Each degree-seeking student must file an approved Plan of Study, developed with a faculty advisor, before the student registers for the 12th credit hour. The Academic Regulations portion of the Graduate Catalog may be consulted for additional information.

A student may only earn the M.S.E. degree once. Therefore, students wishing to complete two of the three M.S.E. majors (*i.e.*, double major) must complete all requirements for both majors before the degree is awarded. A maximum of 12 credit hours may be counted toward both majors, as approved by the student's academic advisor in each major. An option must be selected for each major and the two options are permitted to be different. However, each major must have its own comprehensive assessment (*i.e.*, comprehensive project, thesis, or comprehensive examination). For example, a single thesis and defense cannot satisfy the requirements for both majors.

Students may choose to complete either the project option, the thesis option, or the coursework only option after consultation with their academic advisors.

Project Option. The comprehensive project involves the application of coursework completed as part of the degree to a practical problem. Students will work with their advisors to identify an appropriate project and scope. Students must prepare a formal written report and deliver an oral presentation to a committee. Students register for TE 699, Comprehensive Project (3 hrs.) during the semester in which their project will be completed and presented, but preliminary work on the project may commence before that semester.

Thesis Option. The thesis option involves the completion of 6 hours of research (ENGR 682) under the direction of an advisor on an approved project. Students must summarize their work in the form of a formal, written document and successfully defend the thesis before a committee. Thesis work is typically conducted over two semesters.

Coursework Only Option. Students can complete 33 hours of coursework and then complete a comprehensive examination within the last two semesters of graduation to fulfill the requirements of their degree program. Examinations will be administered once per semester for all students.

MAJOR: Engineering Management

Project Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
TE	699	Comprehensive Project	3 hrs.

Elective courses (see approved Engineering Management electives below) 6 hrs.

Thesis Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
ENGR	682	Research	6 hrs.

Elective courses (see approved Engineering Management electives below) 3 hrs.

Coursework Only Option (33 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.

EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.

Elective courses (see approved Engineering Management electives below) 12 hrs.

Approved Elective Courses for the Engineering Management Major

Any EM (Engineering Management) course.
Any TM (Technology Management) course.
Any College of Business course approved in advance by the advisor.
Any engineering course approved in advance by the advisor.

MAJOR: Environmental Engineering

Each Environmental Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by their advisor before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation Courses:

ENGR 318 Fluid Mechanics
CE 331 Hydraulic Engineering
CE 432 Water/Wastewater Treatment

Project Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs
TE	699	Comprehensive Project	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 12 hrs

Thesis Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs
ENGR	682	Research	6 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
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(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 9 hrs.

Coursework Only Option. (33 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 18 hrs

Approved Elective Courses for the Environmental Engineering Major

Any ENVE course.
Any course listed above not already taken.
ES 550 Environmental Law
ES 630 Environmental Site Assessment
ES 640 Groundwater Principles and Monitoring
Other courses approved in advance by the student's advisor.

MAJOR: Transportation and Infrastructure Engineering

Each Transportation and Infrastructure Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by his or her advisor, before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation courses

CE	312	Structural Analysis
CE	342	Transportation Engineering
CE	413	Reinforced Concrete or CE 414 Steel Design

Students pursuing the Project Option or the Thesis Option must choose either Transportation Engineering or Structural Engineering as their primary focus. The other discipline will be the student's secondary focus. Three courses must be completed in the primary focus and two courses in the secondary focus for the Project and Thesis options. The Coursework Only Option requires three courses in both disciplines.

Project Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Three (3) Elective Courses			9 hrs.
ENGR	699	Comprehensive Project	3 hrs.

Thesis Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Two (2) Elective Courses			6 hrs.
ENGR	682	Research	6 hrs.

Coursework-Only Option (33 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
EM	660	Project Management	3 hrs.
Three (3) Courses in Structural Engineering			9 hrs.

Three (3) Courses in Transportation Engineering			9 hrs.
Three (3) Elective Courses			9 hrs.

Structural Engineering Courses

CE	612	Structural Steel Design and Behavior	3 hrs.
CE	614	Advanced Reinforced Concrete Structure Design and Behavior	3 hrs.
CE	615	Finite Element Applications in Civil Engineering	3 hrs.
CE	616	Pre-stressed Concrete Design	3 hrs.
CE	618	Bridge Engineering	3 hrs.

Transportation Engineering Courses

CE	534	Geometric Design of Highways	3 hrs.
CE	538	Pavement Design	3 hrs.
CE	634	Traffic Engineering	3 hrs.
CE	635	Evaluation of Transportation Systems	3 hrs.
CE	636	Transportation Planning	3 hrs.
CE	637	Highway Safety Engineering	3 hrs.

Approved Elective Courses for the Transportation and Infrastructure Engineering Major

Any Transportation Engineering or Structural Engineering course not already taken.
Any ENVE (Environmental Engineering) course approved in advance by the student's advisor.
Any EM (Engineering Management) course approved in advance by the student's advisor.
Other courses approved in advance by the student's advisor.

CURRENT CATALOG DESCRIPTION WITH CHANGES MARKED

ENGINEERING, M.S.

Majors

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C. Have an undergraduate cumulative GPA of 2.50 or greater. and satisfy at least two of the following:
   (1) Pass the FE exam;
   (2) Verbal GRE score of at least 145;
   (3) quantitative GRE score at least 150; and/or
   (4) analytical writing GRE score at least 3.0.

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A student may only earn the M.S.E. degree once. Therefore, students wishing to complete two of the three M.S.E. majors (*i.e.*, double major) must complete all requirements for both majors before the degree is awarded. A

maximum of 12 credit hours may be counted toward both majors, as approved by the student's academic advisor in each major. An option must be selected for each major and the two options are permitted to be different. However, each major must have its own comprehensive assessment (*i.e.*, comprehensive project, thesis, or comprehensive examination). For example, a single thesis and defense cannot satisfy the requirements for both majors.

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Project Option. The comprehensive project involves the application of coursework completed as part of the degree to a practical problem. Students will work with their advisors to identify an appropriate project and scope. Students must prepare a formal written report and deliver an oral presentation to a committee. Students register for TE 699, Comprehensive Project (3 hrs.) during the semester in which their project will be completed and presented, but preliminary work on the project may commence before that semester.

Thesis Option. The thesis option involves the completion of 6 hours of research (ENGR 682) under the direction of an advisor on an approved project. Students must summarize their work in the form of a formal, written document and successfully defend the thesis before a committee. Thesis work is typically conducted over two semesters.

Coursework Only Option. Students ~~can~~ complete ~~33~~ 30 hours of coursework and then complete a comprehensive examination within the last two semesters of graduation to fulfill the requirements of their degree program. Examinations will be administered once per semester for all students.

MAJOR: Engineering Management

Coursework Only Option (~~33~~ 30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.

Elective courses (see approved Engineering Management electives below) ~~12~~ 9 hrs.

Project Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
TE	699	Comprehensive Project	3 hrs.

Elective courses (see approved Engineering Management electives below) 6 hrs.

Thesis Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
ENGR	682	Research	6 hrs.

Elective courses (see approved Engineering Management electives below) 3 hrs.

Approved Elective Courses for the Engineering Management Major

Any EM (Engineering Management) course.
Any TM (Technology Management) course.
Any College of Business course approved in advance by the advisor.
Any engineering course approved in advance by the advisor.

MAJOR: Environmental Engineering

Each Environmental Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by their advisor before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation Courses:

ENGR 318 Fluid Mechanics
CE 331 Hydraulic Engineering
CE 432 Water/Wastewater Treatment

Coursework Only Option. (~~33~~ 30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) ~~18~~ 15 hrs

Project Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs
TE	699	Comprehensive Project	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 12 hrs

Thesis Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs

ENGR	682	Research	6 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 9 hrs.

Approved Elective Courses for the Environmental Engineering Major

Any ENVE course.
Any course listed above not already taken.
ES 550 Environmental Law
ES 630 Environmental Site Assessment
ES 640 Groundwater Principles and Monitoring
Other courses approved in advance by the student's advisor.

MAJOR: Transportation and Infrastructure Engineering

Each Transportation and Infrastructure Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by his or her advisor, before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation courses

CE	312	Structural Analysis
CE	342	Transportation Engineering
CE	413	Reinforced Concrete or CE 414 Steel Design

Students pursuing the Project Option or the Thesis Option must choose either Transportation Engineering or Structural Engineering as their primary focus. The other discipline will be the student's secondary focus. Three courses must be completed in the primary focus and two courses in the secondary focus for the Project and Thesis options. The Coursework Only Option requires three courses in both disciplines.

Coursework-Only Option (~~33~~ 30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
EM	660	Project Management	3 hrs.
Three (3) Courses in Structural Engineering			9 hrs.
Three (3) Courses in Transportation Engineering			9 hrs.
Three (~~3~~2) Elective Courses			~~9~~ 6 hrs.

Project Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Three (3) Elective Courses			9 hrs.
ENGR	699	Comprehensive Project	3 hrs.

Thesis Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Two (2) Elective Courses			6 hrs.
ENGR	682	Research	6 hrs.

Structural Engineering Courses

CE	612	Structural Steel Design and Behavior	3 hrs.
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Transportation Engineering Courses

CE	534	Geometric Design of Highways	3 hrs.
CE	538	Pavement Design	3 hrs.
CE	634	Traffic Engineering	3 hrs.
CE	635	Evaluation of Transportation Systems	3 hrs.
CE	636	Transportation Planning	3 hrs.
CE	637	Highway Safety Engineering	3 hrs.

Approved Elective Courses for the Transportation and Infrastructure Engineering Major

Any Transportation Engineering or Structural Engineering course not already taken.
Any ENVE (Environmental Engineering) course approved in advance by the student's advisor.
Any EM (Engineering Management) course approved in advance by the student's advisor.
Other courses approved in advance by the student's advisor.

CLEANED UP NEW CATALOG DESCRIPTION

ENGINEERING, M.S.

Majors

Engineering Management
Environmental Engineering
Transportation and Infrastructure Engineering.

Program Description

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A. Pass the PE exam, or
B. Have an undergraduate cumulative GPA of 3.00 or greater, or
C. Have an undergraduate cumulative GPA of 2.50 or greater. and satisfy at least two of the following:
   (1) Pass the FE exam;
   (2) Verbal GRE score of at least 145;
   (3) quantitative GRE score at least 150; and/or
   (4) analytical writing GRE score at least 3.0.

Additionally, to be considered for admission, international students must have an iBT TOEFL score of at least 85. or a Paper-Based TOEFL score of at least 527.

Students who do not meet admission requirement options A, B, or C arc welcome to apply, and their applications will be considered for admission on a case-by-case basis. The program admission recommendation will be decided by the M.S.E. degree program coordinator based on a combination of GRE scores and level of performance in undergraduate engineering coursework. Applicants who do not meet the above criteria but who do have an undergraduate engineering degree are welcome to apply as non-degree seeking students and take courses toward an M.S.E. degree. If a non-degree seeking student has at least a minimum cumulative graduate GPA of 3.30 in his or her first 9 credit hours of CITE M.S.E. courses, that student may re-apply to the university to be considered for admission to the M.S.E. degree program.

Eligibility to take the PE exam is based primarily on completion of an ABET-accredited undergraduate engineering degree in most states. Completion of a M.S.E. graduate degree at an institution with an ABET-accredited undergraduate degree does not fulfill that requirement to take the PE exam.

Degree Requirements

Each degree candidate is required to complete at least 30graduate credit hours, depending on the option chosen below (project, thesis, or coursework only), with a cumulative Grade Point Average of 3.0 for the courses included in the student's Plan of Study. At least one-half of the minimum required hours for the degree must be earned in classes numbered 600 or above.

Each degree-seeking student must file an approved Plan of Study, developed with a faculty advisor, before the student registers for the 12th credit hour. The Academic Regulations portion of the Graduate Catalog may be consulted for additional information.

A student may only earn the M.S.E. degree once. Therefore, students wishing to complete two of the three M.S.E. majors (*i.e.*, double major) must complete all requirements for both majors before the degree is awarded. A

maximum of 12 credit hours may be counted toward both majors, as approved by the student's academic advisor in each major. An option must be selected for each major and the two options are permitted to be different. However, each major must have its own comprehensive assessment (*i.e.*, comprehensive project, thesis, or comprehensive examination). For example, a single thesis and defense cannot satisfy the requirements for both majors.

Students may choose to complete either the project option, the thesis option, or the coursework only option after consultation with their academic advisors.

Project Option. The comprehensive project involves the application of coursework completed as part of the degree to a practical problem. Students will work with their advisors to identify an appropriate project and scope. Students must prepare a formal written report and deliver an oral presentation to a committee. Students register for TE 699, Comprehensive Project (3 hrs.) during the semester in which their project will be completed and presented, but preliminary work on the project may commence before that semester.

Thesis Option. The thesis option involves the completion of 6 hours of research (ENGR 682) under the direction of an advisor on an approved project. Students must summarize their work in the form of a formal, written document and successfully defend the thesis before a committee. Thesis work is typically conducted over two semesters.

Coursework Only Option. Students complete 30 hours of coursework and then complete a comprehensive examination within the last two semesters of graduation to fulfill the requirements of their degree program. Examinations will be administered once per semester for all students.

MAJOR: Engineering Management

Coursework Only Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.

Elective courses (see approved Engineering Management electives below) 9 hrs.

Project Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
TE	699	Comprehensive Project	3 hrs.

Elective courses (see approved Engineering Management electives below) 6 hrs.

Thesis Option (30 hours)

Required courses

EM	620	Management of Technical Human Resources and Organizations	3 hrs.
EM	660	Project Management	3 hrs.
EM	668	Operations Management	3 hrs.
EM	670	Seminar in Engineering Management	3 hrs.
EM	675	Engineering Economics (or TM equivalent)	3 hrs.
EM	694	Engineering Law	3 hrs.
ENGR	610	Applied Statistics	3 hrs.
ENGR	682	Research	6 hrs.

Elective courses (see approved Engineering Management electives below) 3 hrs.

Approved Elective Courses for the Engineering Management Major

Any EM (Engineering Management) course.
Any TM (Technology Management) course.
Any College of Business course approved in advance by the advisor.
Any engineering course approved in advance by the advisor.

MAJOR: Environmental Engineering

Each Environmental Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by their advisor before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation Courses:

ENGR 318 Fluid Mechanics
CE 331 Hydraulic Engineering
CE 432 Water/Wastewater Treatment

Coursework Only Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 15 hrs

Project Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs
TE	699	Comprehensive Project	3 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 12 hrs

Thesis Option. (30 hours)

Required courses

One of: ENGR 610, ENGR 620, or ME 601			3 hrs
ENVE	615	Environmental Chemistry	3 hrs

ENGR	682	Research	6 hrs

Three courses – one per category – from among the following six categories 9 hrs

(1) Engineering Management: EM 660
(2) Water/Wastewater: ENVE 616 or ENVE 617
(3) Solid/Hazardous Waste: ENVE 620 or ENVE 625
(4) Air Pollution: ENVE 611, ENVE 612, ENVE 680, or ES 604
(5) Hydraulics/Hydrology: ENVE 670, ENVE 671, or ENVE 672
(6) Env. Remediation/Risk/Mgmt: ENVE 682, ES 514, ES 620

Elective courses (see approved Environmental Engineering electives below) 9 hrs.

Approved Elective Courses for the Environmental Engineering Major

Any ENVE course.
Any course listed above not already taken.
ES 550 Environmental Law
ES 630 Environmental Site Assessment
ES 640 Groundwater Principles and Monitoring
Other courses approved in advance by the student's advisor.

MAJOR: Transportation and Infrastructure Engineering

Each Transportation and Infrastructure Engineering major must have completed the Foundation Courses listed below (and their associated prerequisites), or their equivalents as approved by his or her advisor, before being fully admitted. Until this requirement is satisfied, the student can only receive Provisional admission to the program. All other admission requirements must still be satisfied.

Foundation courses

CE	312	Structural Analysis
CE	342	Transportation Engineering
CE	413	Reinforced Concrete or CE 414 Steel Design

Students pursuing the Project Option or the Thesis Option must choose either Transportation Engineering or Structural Engineering as their primary focus. The other discipline will be the student's secondary focus. Three courses must be completed in the primary focus and two courses in the secondary focus for the Project and Thesis options. The Coursework Only Option requires three courses in both disciplines.

Coursework-Only Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
EM	660	Project Management	3 hrs.
Three (3) Courses in Structural Engineering			9 hrs.
Three (3) Courses in Transportation Engineering			9 hrs.
Three (2) Elective Courses			6 hrs.

Project Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Three (3) Elective Courses			9 hrs.
ENGR	699	Comprehensive Project	3 hrs.

Thesis Option (30 hours)

ENGR	610	Applied Statistics or other Advisor-Approved MTH course	3 hrs.
Three (3) Courses in Primary Focus (Structural Engineering or Transportation Engineering)			9 hrs.
Two (2) Courses in Secondary Focus (Structural Engineering or Transportation Engineering)			6 hrs.
Two (2) Elective Courses			6 hrs.
ENGR	682	Research	6 hrs.

Structural Engineering Courses

CE	612	Structural Steel Design and Behavior	3 hrs.
CE	614	Advanced Reinforced Concrete Structure Design and Behavior	3 hrs.
CE	615	Finite Element Applications in Civil Engineering	3 hrs.
CE	616	Pre-stressed Concrete Design	3 hrs.
CE	618	Bridge Engineering	3 hrs.

Transportation Engineering Courses

CE	534	Geometric Design of Highways	3 hrs.
CE	538	Pavement Design	3 hrs.
CE	634	Traffic Engineering	3 hrs.
CE	635	Evaluation of Transportation Systems	3 hrs.
CE	636	Transportation Planning	3 hrs.
CE	637	Highway Safety Engineering	3 hrs.

Approved Elective Courses for the Transportation and Infrastructure Engineering Major

Any Transportation Engineering or Structural Engineering course not already taken.
Any ENVE (Environmental Engineering) course approved in advance by the student's advisor.
Any EM (Engineering Management) course approved in advance by the student's advisor.
Other courses approved in advance by the student's advisor.