

CIVIL ENGINEERING, MS

The department offers programs leading to the Master of Science in civil engineering, Master of Science in engineering (environmental engineering) and Doctor of Philosophy degrees in civil engineering. Research programs in the department include environmental quality and water resources; management and safety of transportation systems; structural engineering including assessment, renewal, and protection of infrastructure; and construction engineering and management. Laboratory facilities are provided for graduate research and instruction in these and other areas.

Admissions

In addition to the minimum Graduate School admission requirements, to be considered for regular admission an applicant should have earned a baccalaureate degree from an institution accredited by the Engineering Accreditation Council (EAC) of ABET Inc. Applications who are graduates of a non EAC/ABET-accredited program will be considered.

See the Admission Criteria section of this catalog for more information.

Curricular Requirements

The basic requirements for both the master of science in civil engineering and master of science in engineering (environmental engineering) are identical. A total of 30 hours is required for a master's degree, consisting of at least 24 regular course hours and 6 or more thesis research hours for Plan I students. The student's adviser and supervisory committee work with the student to define an appropriate plan of study that meets all degree requirements, including any prerequisite or preparatory work and a core set of courses as required and specified by each specialty area. Plan II students must pass CE 501 MS Capstone Proj. Plan II.

Thesis Option (Plan I)

Code and Title	Hours
Required Coursework	
CE 593 Practicum	3
Core Coursework	
Construction Engineering and Management	
CE 573 Statistical Applications	
CE 567 Constr. Accounting & Finance	
CE 568 Construction Scheduling	
Structural Engineering and Materials	
CE 573 Statistical Applications	
CE 534 Advanced Structural Mechanics	
CE 531 Structural Dynamics	
Environmental and Water Resources Engineering	
CE 573 Statistical Applications	
CE 524 Water & Wastewater Treatment	
CE 575 Hydrology	
Transportation Systems Engineering	
CE 573 Statistical Applications	
CE 591 Special Problems (When offered as Statistics & Econometrics for Engineers)	
CE 559 Pavement Design and Rehab	
Elective Coursework	12

These are commonly taken elective courses. More elective options available upon consultation with faculty advisor.

Construction Engineering and Management	
CE 517	Advanced Project Management
CE 518	Engineering Mangement
CE 561	Horizontal Construction Method
CE 562	Vertical Construction Methods
CE 563	Construction Cost Estimating
CE 564	Safety Engineering
CE 581	Legal Asp. of Eng and Const.
Structural Engineering and Materials	
CE 530	NDT of Structures
CE 532	Matrix Analysis of Structures
CE 535	Concrete Materials
CE 537	Reinforced Concrete Struct II
CE 538	Struct Steel Design II
CE 543	Prestressed Concrete Design
CE 544	Foundation Engineering
CE 591	Special Problems (When offered as Structural Concrete Behavior)
Environmental and Water Resources Engineering	
CE 526	Groundwater Mechanics
CE 529	EWR Proposal Writing
CE 576	Process Hydrology
CE 585	Constructn Site Erosion Contrl
Transportation Systems Engineering	
CE 551	Roadway/Intersection Design
CE 552	Traffic Safety and Security
CE 553	Intelligent Transportation Sys
CE 554	Urban Transportation Planning
CE 555	Traffic Flow Theory
CE 558	Traffic Engineering
Thesis Course	
CE 599	Thesis Research
Total Hours	
Non-Thesis Option (Plan II)	
Code and Title	Hours
Require Course	
CE 593	Practicum
CE 501	MS Capstone Proj. Plan II
Core Coursework	
Construction Engineering and Management	
CE 573	Statistical Applications
CE 567	Constr. Accounting & Finance
CE 568	Construction Scheduling
Structural Engineering and Materials	
CE 573	Statistical Applications
CE 534	Advanced Structural Mechanics
CE 531	Structural Dynamics

Environmental and Water Resources Engineering

CE 573 Statistical Applications

CE 524 Water & Wastewater Treatment

CE 575 Hydrology

Transportation Systems Engineering

CE 573 Statistical Applications

CE 591 Special Problems (When offered as Statistics & Econometrics for Engineers)

CE 559 Pavement Design and Rehab

Elective Coursework**15**

These are commonly taken elective courses. More elective options available upon consultation with faculty advisor.

Construction Engineering and Management

CE 517 Advanced Project Management

CE 518 Engineering Management

CE 561 Horizontal Construction Method

CE 562 Vertical Construction Methods

CE 563 Construction Cost Estimating

CE 564 Safety Engineering

CE 581 Legal Asp. of Eng and Const.

Structural Engineering and Materials

CE 530 NDT of Structures

CE 532 Matrix Analysis of Structures

CE 535 Concrete Materials

CE 537 Reinforced Concrete Struct II

CE 538 Struct Steel Design II

CE 543 Prestressed Concrete Design

CE 544 Foundation Engineering

CE 591 Special Problems (When offered as Structural Concrete Behavior)

Environmental and Water Resources Engineering

CE 526 Groundwater Mechanics

CE 529 EWR Proposal Writing

CE 576 Process Hydrology

CE 585 Constructn Site Erosion Contrl

Transportation Systems Engineering

CE 551 Roadway/Intersection Design

CE 552 Traffic Safety and Security

CE 553 Intelligent Transportation Sys

CE 554 Urban Transportation Planning

CE 555 Traffic Flow Theory

CE 558 Traffic Engineering

Total Hours**30**

- Students on graduate assistantships must register for a minimum of 1 credit hour of CE 593 Practicum each semester they are supported.
- Only 400-level courses without 500-level counterparts are allowed and must be approved prior to taking the class.
- Students are responsible for all forms and must route all forms through the Department prior to submission to UA's Graduate School.

See the Master's Degrees Graduate School requirement section of this catalog for additional information.

Transfer Credit

12 hours maximum of approved transfer credit. Additional information on Transfer Credit.

Accelerated Master's Program

AMP (BS/MS) students are allowed 9 credit hours of coursework to double count between the BS and MS degrees. Additional information on the Accelerated Master's Program.

Comprehensive Examination/Capstone

The paper/report, or non-thesis, option requires a research paper, a policy and practice paper, or equivalent culminating experience, which is graded by the student's graduate advisor.

- Taken with permission under the direction of the student's graduate advisor
- The graduate advisor must be a full member of the department's graduate faculty
- Requires completion a research paper, a policy and practice paper, or equivalent report with the topic, scope, and format pre-approved by the student's advisor
- Must be taken the semester the student plans to graduate

Plan I - Thesis Process Requirements

The thesis option is a research-focused program that includes conducting original research, writing a research thesis and defending the thesis to the student's graduate supervisory committee. The research thesis option degree requirements are as follows:

A minimum of 30 credit hours, including

- 21 credit hours of approved coursework, including
 - 9 credit hours of core graduate coursework
 - A maximum of 6 hours of approved 400-level courses (Use Graduate School's "Approval of 400-Level Course for Master's Credit" form.)
 - A minimum of 15 hours of CE-prefix courses
- 3 hours of CE 593 Practicum or CE 693 Practicum
 - Taken with permission under the supervision of the student's graduate advisor
- 6 hours of CE 599 Thesis Research
 - Taken with permission under the supervision of the student's graduate advisor
 - The graduate advisor must be a full member of the department's graduate faculty
 - Once taken, CE 599 Thesis Research must be taken every term until graduation

Additional Requirements:

- 6 hours maximum of approved 400-level courses
- 15 hours minimum of CE courses
- Thesis Committee and Defense
 - Minimum of three graduate faculty, with the majority from the department and at least one member from outside the department
 - Maximum of two attempts to pass defense

- The Committee may require additional prerequisite courses (not allowed as part of the Plan of Study) for those students without an ABET/EAC-accredited degree

Plan II - Non-thesis Process Requirements

The paper/report option requirements are as follows:

A minimum of 30 credit hours, including

- 27 credit hours of approved coursework
 - 9 credit hours of core graduate coursework
 - A maximum of 6 hours of approved 400-level courses (Use Graduate School's "Approval of 400-Level Course for Master's Credit" form.)
 - A maximum of 3 hours of CE 593 Practicum or CE 693 Practicum
 - A minimum of 18 hours of CE-prefix courses
- 3 credit hours of CE 501 MS Capstone Proj. Plan II

Time Limits for Degree Completion Requirements

Maximum of 6 years to complete all degree requirements. Graduate School information on Time Limits.

Student Progress Requirement

Graduate School information on Student Progress.

Academic Misconduct Information

Graduate School information on Academic Misconduct.

Withdrawals and Leave of Absence Information

Graduate School information on Withdrawals and Leave of Absence.

Academic Grievances Information

Graduate School information on Academic Grievances.

Scholastic Requirements

Graduate School information on Scholastic Requirements.

Graduate School Deadlines Information

Graduate School information on Graduate School Deadlines.

Application for Graduation Information

Application for Graduation.

Master's Degrees

The primary purpose of master's degree programs is to provide students with subject matter at an advanced level in their fields of study. Master's degrees are designed to assist students either to continue their graduate studies or to meet the goals of their professions. In most cases, master's programs also help students become familiar with methods of independent investigation.

Program Requirements

Two plans are offered for the master's degree:

Plan I. Candidates for the master's degree under Plan I must earn a minimum of 24 semester hours of credit in coursework plus earn a minimum of 6 additional hours of thesis research hours, for a total of 30 hours.

Plan II. Candidates for the master's degree under Plan II must earn a minimum of 30 semester hours of coursework credit and pass the comprehensive examination or complete a culminating or "capstone experience" as described under the Comprehensive Examinations section below.

Both plans require a minimum of 18 semester hours in the major subject.

With the approval of the major department, the remainder of the coursework may be completed in either the major or a related field.

In some divisions and in many departments of the University, candidates are required to do their work under Plan I. Candidates working under Plan II may be required to participate successfully in seminar or problem courses that will give them an acquaintance with the methods of research and an appreciation of the place and function of original investigation in the field.

Residency Requirements

A student's program at the master's level must provide sufficient association with the resident faculty to permit individual evaluation of the student's capabilities and achievements.

Graduate Credit

A student must be admitted to the Graduate School and must register as a graduate student in order to receive graduate credit. Approval for graduate registration must be obtained from program advisors prior to registration.

Graduate Credit for Noncredit Experiences

All course credit used toward a UA graduate degree must be taught at the graduate level. No graduate credit may be earned for experiential learning not conducted under the direct supervision of graduate faculty of The University of Alabama. UA does not offer graduate credit for noncredit workshops, seminars, continuing education experiences, professional development, internships, work/life experience, and so forth.

Transfer of Credit

Courses of full graduate-level credit earned in a *regionally* accredited institution where a student was enrolled in the graduate school, may be submitted for review for inclusion in a master's degree program. Evaluation of credit for transfer will not be made until after the student has enrolled in the Graduate School of The University of Alabama. Acceptance of credit requires the approval of the student's advisory committee and the dean of the Graduate School.

A student initiates the Request for Transfer of Graduate Credit form and must ensure that the Graduate School receives an official transcript from the outside institution. This should be done well in advance of the final semester, otherwise it may delay graduation and awarding of the degree.

With the approval of the student's department and the dean of the Graduate School, the greater of 12 hours or 25 percent of the required coursework for a master's degree may be transferred from an outside institution. Some master's degree programs allow fewer hours to be transferred. Be sure to check with your department's graduate program director regarding your department's transfer policy. Eligible coursework will have been earned during the six-year period (18 fall, spring and summer semesters) preceding the semester of admission to the UA master's program. Only courses in which a student earned a "B" grade or better may be transferred. Thesis Research (599) may not be

transferred in from an outside institution. If approved, such coursework can be counted toward the minimum hours and coursework requirements for the master's degree.

In some cases, foreign educational credentials may not meet the Graduate School's criteria for transfer of credit. It may be necessary for students in this situation to secure an evaluation of their credentials from World Education Services Inc. (WES), an external foreign credential evaluation service. Additional information on their services can be found at their website.

400-Level Courses

A maximum of 6 semester hours of 400-level course credit may be accepted for graduate credit and used toward a master's degree. The department needs to submit the Approval of 400-Level Course Work for Master's Credit form through the UA DocuSign system in myBama. This form must be submitted for approval to the Graduate School by the last day to add a course for the semester in which the course will be taken.

Time Limit

All requirements for the master's degree must be completed during the six years (18 fall, spring, and summer semesters) immediately preceding the date on which the degree is to be awarded. Previously approved transferred coursework that falls within six years of *admission* to the master's degree program can be counted toward the minimum hours requirement. There is no provision for an extension of the time limit beyond six years for master's students.

Revalidation of Expired Credits

There may be particular and limited instances where a student is re-admitted to a graduate program, and revalidation of expired credits is justified. In such cases, where the department and Graduate School feel it is appropriate to do so, the student may work with the graduate program director to petition for such revalidation, on a course-by-course basis. For each course for which revalidation is requested, the student must demonstrate, to the department's satisfaction, that the knowledge and skills gained in that course are still current. Currency will be evaluated by a committee of faculty, composed of at least three graduate faculty members within the degree program to which the student is requesting re-admission, and two from a separate department.

The committee will then issue a recommendation to the dean of the Graduate School, who will rule on the petition.

Some methods for demonstrating currency may include but are not limited to 1) a professional portfolio; 2) an exam or essay linked to each course and demonstrating up-to-date knowledge; 3) a re-take of the comprehensive exams under current program guidelines, and/or 4) other methods deemed appropriate by the committee.

Students may request revalidation of up to 50% of the required minimum coursework for their degree. Credits earned from an institution other than The University of Alabama may not be revalidated.

Consideration of revalidation, and a plan of study based on the demonstration-of-currency and other remaining requirements, must be completed as part of the student's re-admission to the Graduate School. Revalidation of credits is not guaranteed. From the time of re-admission, students must complete the degree within the standard time limit, as specified in the Graduate Catalog at the time of the student's re-admission.

Thesis

A thesis evidencing research capacity, independent thought, and the ability to interpret materials is required of all master's degree candidates

who pursue Plan I. The subject chosen must be in the major field and must be approved by the graduate committee of the major department or school and by the head of the student's major department or division.

A thesis committee must consist of at least three members appointed by the dean of the Graduate School. Students set up their committee through the Graduate School Graduate Student portal. The request normally is made as soon as the successful defense of the thesis proposal has been completed. All members of a thesis committee must be members of the Graduate Faculty. The Committee Chair must be a full or associate member of the Graduate Faculty. One member must be from outside the student's major department. The majority of the thesis committee must be full-time regular University of Alabama faculty.

If the outside member is not a full or associate member of the UA Graduate Faculty (e.g., a highly qualified person from another university, a business, or industry), the graduate dean needs to appoint that member by approving Affiliate Graduate Faculty status for the specific purpose of serving on the student's thesis committee. Unless there are extraordinary circumstances meriting approval by the graduate dean before the final oral defense of the thesis, all members of the thesis committee must attend the defense.

The candidate must give members of the examining committee a minimum of two weeks to read the thesis before the date of the final oral examination. All members must agree that the student is ready for the final oral thesis defense. A final oral thesis defense is required of all students completing a thesis. All members of the thesis committee must be members of the UA graduate faculty and must attend the final oral thesis defense unless there are extraordinary circumstances warranting the graduate dean's approval of the absence prior to the defense meeting.

The final oral thesis defense is the culminating experience in the master's program. As such, all members of the thesis committee are expected to attend and participate in real time. Virtual attendance via interactive video or teleconference is permitted for off-campus external committee members, but the student and Tuscaloosa campus faculty should attend in person unless extraordinary circumstances dictate the need for virtual attendance. In circumstances where virtual participation is necessary, all participants must follow the Virtual Participation guidelines found below.

Virtual Participation in Committee-Based Exams/Defenses

All members of a student's graduate committee are expected to attend and participate, usually in person, in any oral examination as part of the student's graduate (Master's or Doctoral) degree program. Traditionally, oral examinations are conducted with the student meeting their committee while gathered in one physical location on campus. However, the need occasionally arises for virtual participation in the oral examination.

If a department or program chooses to allow virtual participation in oral examinations, they must ensure adherence to the following technical requirements. Departments or programs may enforce stricter guidelines than those outlined, including an on-campus-only policy if deemed necessary and appropriate.

Technical Requirements

In cases where departments or programs allow any level of virtual participation, from one virtual member to a fully virtual event, they must adhere to the following requirements:

1. Prior to any oral exam, the student and Committee Chair coordinate with other committee members regarding the protocol for the exam.

2. All participants must join using university-adopted videoconferencing tools that allow for **fully interactive** audio and video communications along with screen-sharing capabilities, which must be maintained throughout the examination and any related discussion.
3. The use of audio-only communications is not permitted.
4. Participation merely by viewing a recording of the oral examination is specifically prohibited.
5. All members of the committee, on- or off-site, must participate in the final evaluation of the examination or defense; provisions must be made to record their votes and collect their signatures as necessary using the digital signature system approved by the Graduate School.
6. The Committee Chair, or another non-student designee, shall be the host of the virtual meeting. A co-host may be assigned so that the event will not be interrupted by technical difficulties. The host should mute all participants (or ask participants to mute themselves) and ask the student to share their screen, if a presentation is involved, in order to make the presentation visible to all attendees. The host must also ensure that appropriate security precautions are taken to prevent the interruption of the event.
7. Following the public portion of the defense, the host shall ask all non-committee members to leave the meeting, or the host may manually remove them. In programs where the defense has both a public and a private portion, the committee may then continue the event as outlined in their program protocols.
8. Once the committee has completed the examination of the student, the host shall place the student into the waiting room (or have the committee members use a breakout room) so the committee can conduct their deliberations in private.

The committee chair must have a secondary videoconferencing system available as a back-up in the case of technical difficulties. Cancellation of the examination should only occur in the case where both the primary and secondary back-up systems fail. If an examination must be rescheduled, it will be done without prejudice to the student. Since committee deliberations are an essential aspect of the examination, completing the examination and final discussion via email or other non-audiovisual means is not an option. If the student or any committee member(s) have a disability that will be impacted by virtual participation, accommodations for participation must be provided.

Article Style vs. Journal Format for Master's Theses

Article Style.

At the doctoral level, "article-style dissertations" are unified works that include several distinct but related studies of research or creative activity, each of which is of publishable quality. The University does not permit an "article-style thesis" to be presented for a master's degree.

Journal Format.

A "journal-format thesis" is acceptable. Such a thesis follows the format of a particular journal in which the student and advisor want the thesis to be published. To prepare a journal-format thesis, the student uses the journal's "information for authors" or similarly titled guidelines in conjunction with the Graduate School's Thesis and Dissertation page for formatting guidelines.

Theses must comply with the regulations set forth on the Graduate School's website. Approval of the thesis by the graduate dean is necessary before graduation.

The thesis should be completed, if possible, while the student is in residence at the University. To request permission to complete a thesis in absentia, the student must, before leaving the University, submit a

satisfactory outline of the thesis, as well as evidence that adequate facilities are available where the work will be done, to the head of the student's major department.

Protection of Human Subjects for Research

Scientific research involving human subjects has produced substantial benefits for society, but it also can pose troubling ethical questions. The mission of the University's Institutional Review Board (IRB) for Protection of Human Subjects is to ensure that research involving human subjects is conducted ethically. University and federal policies require that review and approval to use human subjects in research precede the research.

In the case of thesis research that involves the use of human subjects in any way, the principal investigator is responsible for contacting the college Human Research Review Committee to obtain approval for the planned research.

Final Thesis Defense

The final oral thesis defense is the culminating experience in the master's program. As such, all members of the thesis committee are expected to attend and participate in real time. The thesis must comply with the Graduate School's formatting and style guidelines.

See the Registration & Assistantships section of the Graduate Catalog for policies regarding registration requirements during the semester of the thesis defense. Generally speaking, graduate programs may allow students to schedule thesis defenses at any time that is mutually agreed upon by the student and the committee. However, defenses should not be scheduled when University offices are closed, as specified in the Academic Calendar. When University offices are open, nine-month faculty may opt to participate in defenses during summer or interim sessions, but are not required to do so.

"Completed" means submitted to ProQuest after being successfully defended, carefully edited following the defense meeting, and having the Committee Acceptance Form (CAF) signed by all committee members, department chairperson, and graduate dean. A majority of the thesis committee must approve the written thesis and defense before submission to the Graduate School. Following the thesis defense, the Committee Acceptance Form is submitted by the thesis chair through the UA DocuSign system in myBama.

Graduate School deadlines, including each semester's thesis deadline, are available at the Graduate School's homepage. Consult the Graduate School's Thesis and Dissertation page for details of ETD submission, including information on what needs to be submitted to the Graduate School. The graduate dean must approve the thesis before the student can be cleared for graduation.

Comprehensive Examinations and Culminating Experiences

In addition to the regular course examinations, all master's candidates must receive a passing grade on a culminating experience (also known as an exit assessment) in which the student is expected to integrate prior learning. Each graduate program, with the approval of the Graduate Council, determines the most appropriate format. The culminating or capstone experience may consist of one or more of the following:

- a written and/or oral examination based on the content of the degree program;
- a thesis and final oral defense;
- a designated course (such as a capstone course) requiring interpretation and integration of information from previous courses;

- a research paper, a "policy and practice" paper, a portfolio or equivalent experience;
- a public performance or exhibition along with a contextualizing paper; and/or
- a practicum or internship.

If the culminating experience requirement is met with the first and/or second option above, then the examining committee for comprehensive examinations must consist of at least three members of the graduate faculty from that department and appointed by the dean of the Graduate School. The examination must be given at least six weeks before the date of graduation (two weeks before for Plan II) and reported promptly to the dean of the Graduate School on appropriate forms. A student may take the final oral or written examination only twice. Failing the examination twice results in dismissal from the degree program and the Graduate School.

If the culminating experience is met with one of the other options, programs may designate how many times the course or experience may be attempted. After the allowable number of attempts, a failing grade results in dismissal from the degree program and the graduate school.

Application for Graduation

Each candidate for a master's degree must submit an Application for Degree via myBama no later than the last day to add a course for the semester (or first term of the summer semester) in which requirements for the degree are to be completed. That specific date is published each semester at the Graduate School's website under Current Students/Deadlines for Graduate Students.

Second Master's Degree

Six (6) semester hours of eligible credit from one master's degree at The University of Alabama may be applied to the requirements for a second master's degree, but only if the department of the second master's agrees to the courses in the plan of study. Any hours from the previous master's degree must have been earned during the six years (18 fall, spring, and summer semesters) immediately preceding the date on which the second degree is to be awarded. ***Please note that if a student double counts six hours between two master's degrees, no hours may double count toward any additional master's degrees.