CIVIL AND ENVIRONMENTAL ENGINEERING
GRADUATE HANDBOOK

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2020
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FOREWORD

This handbook summarizes important policies and guidelines for graduate study in Civil and Environmental Engineering (CEE) for current and prospective graduate students, and graduate advisors. It also includes a set of recommendations for the graduate student and advisor on thesis/dissertation writing and useful tips towards successful and timely completion of the graduate degree in CEE. This handbook represents a convenient supplement to the official University and College policies enunciated in the Tennessee Technological University Graduate Catalog.

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OVERVIEW OF GRADUATE PROGRAM IN CIVIL AND ENVIRONMENTAL ENGINEERING

OVERVIEW OF CEE GRADUATE PROGRAM

The Department of Civil and Environmental Engineering (CEE) combines scholarship, research and advanced coursework to offer a comprehensive and competitive master's degree program in Civil Engineering and doctoral degree program in Engineering. Consistent with the missions of Tennessee Tech University (TTU Mission) and the College of Engineering (CoE Mission and Strategic Goals), the mission of CEE's graduate program is to provide students with the strong academic training required for making significant contributions to the civil and environmental engineering profession in the 21st century, and for becoming well informed productive members of society. The goals of the graduate program include continued improvement of its research and scholarly profile, a coursework portfolio that is relevant to professional practice and research, and the production of graduates who are professionally engaged and dedicated to public service and life-long learning. The CEE department oversees the master's program while the doctoral program is overseen by the College of Engineering's Associate Dean of Research and Innovation.

By virtue of the breadth of the civil engineering discipline, each graduate student is required to select and build emphasis in one of the following six sub-disciplines of the CEE graduate program, namely, Structural Engineering, Environmental Engineering, Transportation Engineering, Construction Materials, Geotechnical Engineering, and Structural Mechanics. Some of these sub-disciplines have their respective areas of specialization. Thus, within the sub-discipline of structural engineering, graduate students specialize in either bridge design or building design. In the sub-discipline of transportation engineering, graduate students specialize either in traffic engineering or in transportation planning. In the sub-discipline of environmental engineering, graduate students specialize in either water resources engineering or environmental quality and wastewater treatment engineering. In recognition of the broad and interdisciplinary background required for development of innovative solutions to civil engineering problems over lifelong careers, the CEE graduate program complements CEE courses with courses in non-civil engineering disciplines such as mathematics, statistics, chemistry, biology, computer science, and other engineering disciplines. Finally, the program links students to the community of researchers and practitioners through participation in local, regional, national, and international technical conferences, as well as in co-op opportunities and internships.

The graduate program is delivered by well-qualified faculty whose respective research interests are documented at the CEE department's webpage (Research Interests of CEE faculty).

HOW TO APPLY FOR GRADUATE STUDY

HOW TO APPLY TO THE GRADUATE PROGRAM IN CIVIL ENGINEERING

A description of the application process and the online application form are provided at Tennessee Tech University's College of Graduate Studies website. Interested students should submit a completed application to the CEE graduate program through this website. Questions relating to the application process should be sent to the College of Graduate Studies at:

College of Graduate Studies,
P.O. Box 5012,
Tennessee Tech University,
Cookeville, TN 38505, U.S.A.
Phone: +1-931-372-3233.
Email: gradstudies@tntech.edu

Admission and funding decisions are based upon the application submitted by the student. CEE uses the criteria for admission defined by the College of Engineering. For the master's program, the criteria are presented at the website https://www.tntech.edu/graduatestudies/masters.php, while for the doctoral program, the criteria are presented at the website https://www.tntech.edu/graduatestudies/doctorate.php.

Interested students should also visit CEE's website to determine the expertise and research interests of CEE faculty and how they align with their research interests.

GENERAL GRADUATE PROGRAM INFORMATION AND REQUIREMENTS

GENERAL GRADUATE PROGRAM INFORMATION AND REQUIREMENTS

1. For a new graduate student, the CEE Chairperson (or designee) will act as the student's advisor until the graduate committee is formed. Any questions regarding the program and coursework may be directed to the advisor.

2. If departmental or external research funds are available, a graduate student may hold an assistantship as a Graduate Teaching Assistant (GTA), Graduate Teaching Associate (GTS), Graduate Support Assistant (GSA), or Graduate Research Assistant (GRA). Definitions of these assistantships are presented at https://catalog.tntech.edu/mime/media/view/28/6140/October+17%2C+2019+Catalog.pdf.

3. Tennessee Tech University requires all graduate assistants to complete the online Title IX and Title VI training modules within the first 30 days of their start date. The links to the required training are at the TTU Human Resources website https://www.tntech.edu/hr/training/index.php.

4. All graduate assistants should be aware of the Family Educational Rights and Privacy Act (FERPA) requirements.

5. All graduate students are encouraged to complete the online annual security awareness training modules located at Security Awareness Training, as well as the Collaborative Institutional Training Initiative (CITI) located at Office of Research's website https://www.tntech.edu/research/researchcompliance/citi_training.php.

6. All graduate students are required to know the rights, responsibilities and regulations pertaining to campus life and academic programs. These can be found in the College of Graduate Studies' Graduate Catalogue website at http://catalog.tntech.edu/index.php?catoid=28.

7. The minimum and maximum permissible course-load for a semester depends on whether or not a student has a graduate assistantship appointment and whether or not a student is International. For acceptable course-load range for a semester, graduate students should refer to Permissible Loads at http://catalog.tntech.edu/content.php?catoid=28&navoid=5754).

   Very rarely, circumstances might prompt a graduate student to seek to take a course load in a semester that exceeds the maximum normally permitted of 12 credit-hours. Approval must be sought for this and the applicable form for initiating the approval process is available at the webpage: https://www.tntech.edu/graduatestudies/pdf/enrolled_student_forms/1476138451_Graduate_Assistant_Request_for_Student_Overload.pdf

   Additionally, all CEE graduate students must comply with Tennessee Tech Policy 240, 271, and 274 found at https://www.tntech.edu/policies/.

8. Useful forms and resources for graduate students can be found at https://www.tntech.edu/engineering/programs/grad/resources.php, https://www.tntech.edu/graduatestudies/forms.php, and https://www.tntech.edu/records/forms.php.

9. All graduate students must refer to the Graduate Student Calendar at the webpage https://www.tntech.edu/graduatestudies/gcalendar.php to learn about important academic deadlines.

10. A copy of all required training documents, appointment of the advisory committee, Program of Study, thesis defense and examination forms, and oral evaluation forms are to be provided to the CEE department for inclusion in the student record file.

11. In addition to satisfying all degree requirements, a candidate for a degree must file an Application for Graduation at the beginning of the semester in which the degree is expected to be conferred. The deadline for the filing of the application is posted on the College of Graduate Studies website each semester.

12. All graduate students must review Tennessee Tech's policy on plagiarism. TTU follows a strict policy on avoiding plagiarism that all graduate students are expected to follow during their candidature. A software called "TurnItIn' is currently made available by the University to all faculty and students for educating about the nature of academic integrity as well as the mechanics of proper citation of sources. For further information on Plagiarism, it is recommended that students check the student handbook that is available online at https://www.tntech.edu/handbooks/ttustudenthandbook/

MASTER OF SCIENCE DEGREE

MASTER OF SCIENCE (M.S.) DEGREE

Admission Requirements for the M.S. Program

The requirements for admission into the CEE M.S. program are the same as those for any M.S. program in the College of Engineering and can be found at the webpage https://www.tntech.edu/graduatestudies/masters.php. The program is designed for graduates of approved undergraduate programs. Thus, a baccalaureate degree in civil engineering is one of the requirements for admission with full standing (See Admission Classifications for definitions of the different admission standings). Applicants that have an undergraduate degree in a field closely related to civil engineering will be evaluated on a case-by-case basis and may be admitted to full standing upon completion of identified background courses.

Program of Study (TTU Policy 271)

(https://tntech.policytech.com/dotNet/documents/?docid=1015&public=true)

A M.S. student is required to file a completed and approved program-of-study form with the College of Graduate Studies by the time nine (9) credit hours are earned. If this requirement is not met, a hold will be put on the student's registration until it is met. If changes in an approved program of study are required or desired, a substitution form should be filed by the student with the College of Graduate Studies.

Submitted programs of study are reviewed by the CEE Department's chairperson and subsequently by the College of Engineering's Associate Dean for Research and Innovation to ensure they satisfy department and college policies before they are approved. If a Program of Study includes independent/directed study courses, such as CEE 6900/7970/7980, they shall be initiated at the CEE sub-discipline level and approved by the CEE Research and Graduate Affairs Committee. A list of topics covered or expected to be covered in those courses shall be attached to the Program of Study. If such a course is used as a substitute for a course in a Program of Study, the list of topics shall accompany the Substitution Form.

Admission to Candidacy

(http://catalog.tntech.edu/content.php?catoid=28&navoid=5755)

A CEE M.S. student must meet the applicable criteria prior to requesting for admission to candidacy, namely:

a. Achieve full standing in his/her graduate program,
b. Complete nine (9) Credit-Hours of Graduate Courses,
c. Have a 3.0 Cumulative GPA.
d. The written approval of the student's graduate advisory committee.
e. The written approval of the CEE chairperson.

If these criteria are met, a M.S. student is automatically granted admission to candidacy during the approval of his/her program of study.

If the student's application for admission to candidacy is not approved due to

academic deficiencies, the student cannot continue graduate study in the CEE department or any of the departments in the College of Engineering.

Graduate Student Advisory Committee Formation and Responsibilities

(Source: Tennessee Tech University Policy No. 271, Section IV, Part M https://tntech.policytech.com/dotNet/documents/?docid=1015)

1. The chairperson of the department or his/her designee is responsible for advising the graduate student during the first semester, if the student has not decided on an academic/research advisor. Registration for Research and Thesis or Dissertation will not be permitted during the first semester of enrollment. However, if needed, a fast-track student may be permitted by the departmental chairperson to register for Research and Thesis credits during the first semester.

2. A graduate student, in consultation with the departmental chairperson or graduate student's research advisor, will determine the formation of the graduate student's advisory committee as part of the Program of Study. A minimum of three (3) advisory committee members is required for a M.S. program. The graduate student's advisory committee members shall represent each of the areas in which the graduate student expects to study, with two (2) members having background in the major area. The graduate student must have at least one (1) committee member with adequate background and research interests in the area in which the student has proposed a research objective. The committee must consist of at least three members of the TTU graduate faculty and must be chaired by a member of the Department of Civil and Environmental Engineering.

3. A graduate student's advisory committee shall be appointed during the student's first semester, but no later than the semester in which 15 credit-hours are earned. There will be a hold placed on any student's registration if an official request for appointment of an advisory committee has not been filed in the College of Graduate Studies Office by the time 15 credit hours have been earned. Failure to form a graduate advisory committee within the required time will result in a registration hold. (http://catalog.tntech.edu/content.php?catoid=28&navoid=5755-Degree Requirements in the graduate catalog under Advisory Committee)

4. After the formation of the committee, each member of a graduate student's advisory committee is expected to review the student's research proposal and to approve it or make recommendations to improve it.

5. Each member of the committee is expected to review the student's thesis prior to the comprehensive examination; and to assist in the conduct of an examination to ensure that the student has at least a satisfactory knowledge of the subject matter covered in the program of study and that the thesis (when required) is of suitable caliber and presents a valid investigation

properly completed.

6. The graduate student is responsible for submitting to the College of Graduate Studies any change to his/her advisory committee.

Degree Requirements

MS Thesis Option

(Source: http://catalog.tntech.edu/content.php?catoid=28&navoid=5755)

The CEE M.S. thesis option requires a minimum of thirty-one (31) credit hours. This comprises twenty-four (24) credit hours of graduate course work, a minimum of six (6) credit hours of Research and Thesis (CEE6990), and one (1) credit hour of Graduate Seminar (CEE 6910).

Coursework

The coursework for all CEE M.S. thesis option students must satisfy the following requirements:

1. At least twenty-one (21) credit hours including Research and Thesis shall be required at the 6000 level or above. The remainder of the courses in the program of study may be at the 5000 level. However, not more than 30 percent of the courses in a student's program of study may be in dually numbered 4000 (5000) courses. Courses below the 5000 level will not be counted toward a graduate degree. Even though they may appear on the written program of study as background requirements, they are excluded from the determination of completion of degree requirements.

2. A maximum of nine (9) credit hours can be transferred from other institutions.

3. At least fifteen (15) credit hours must be CEE courses. Any deviation to this must be approved by the Chairperson of the Department and the student's graduate advisory committee.

4. One (1) credit hour of CEE Graduate Seminar (CEE 6910).

5. A graduate student must achieve a grade of at least "C" on all graduate courses taken. No more than six (6) credit-hours with a grade of “C” can be used as part of the Program of Study.

6. An "I" is assigned when a student's performance has been satisfactory, but for reasons beyond the student's control, he/she has not been able to complete course requirements within the allotted time as determined by the instructor. Students are not required to register for the course again but must complete the original course requirements with the instructor. With approval of the instructor, a student has one (1) calendar year or until the time of graduation, whichever comes first, to remove the "I" during which time the "I" is excluded from calculation of the student's QPA. If the "I" is not removed

within the above time limits, it is automatically changed to a Grade of "IF" and is calculated as "F". If the "I" is not in a required course, the student may be permitted to graduate if permission is granted by the advisor. In such cases, the "I" is computed as an "F" and the cumulative QPA must be at least 3.0. In extenuating circumstances, such as ill health, a student may request an exception to the one-year policy to the Graduate School Executive Committee (GSEC), and must provide detailed and documented evidence of the circumstance that necessitated the delay in removing the "I" grade. The request must be approved by the instructor, advisor, departmental chair, and the dean of the college/school, in that order. The student's advisor or departmental chair must be present when the Graduate School Executive Committee deliberates the request.

Research and Thesis

A minimum of six (6) credit hours of CEE 6990 Research and Thesis is required.

1. M.S. students are required to obtain advisory-committee approval of their proposed M.S. thesis research by submission of a written proposal to the committee followed by an oral presentation in an open forum at a date agreed on with the committee. After responding to comments and questions from the general public in the open forum, the student will address comments and questions from his/her advisory committee in a private session. A student's oral and written communication skills will be assessed by all forum-attendees. Based on the feedback obtained, the student's advisory committee, where necessary, will advise the student on how to strengthen their communication skills. The communication assessment form will be issued by the advisor.

2. When a student makes satisfactory progress in research and thesis, a grade of SP (Satisfactory Progress) will be assigned. When unsatisfactory progress is achieved, a grade of NP (No Progress) will be assigned. Only grades of SP and NP shall be used to indicate a student's progress in thesis-credit or dissertation-credit.
(Source: http://catalog.tntech.edu/content.php?catoid=28&navoid=5755)

3. A grade of NP shall not be counted as having satisfied either program or degree requirements, and the student must register again for additional thesis (or dissertation) credit. A student that receives a grade of "NP" in two consecutive semesters will be dismissed from the program.
(Source: http://catalog.tntech.edu/content.php?catoid=28&navoid=5668)

4. Prior to scheduling the thesis defense, the graduate student must submit the thesis certificate of approval page to the College of Graduate Studies for format review and approval.
(https://tntech.policytech.com/dotNet/documents/?docid=1015&public=true)

5. A thesis draft will be submitted, through the thesis advisor, to the graduate advisory committee at least two weeks prior to the thesis defense.

6. The date, time and location of the defense will be publicized by the College of Engineering and CEE office two weeks prior to the defense. An announcement to publicize the defense must be developed based on College of Engineering's approved template and must be approved by the Associate Dean for Research and Innovation prior to distribution. It is the responsibility of the major advisor, after consultation with the student's graduate advisory committee and the student, to schedule a defense date that allows for the two-week notice.

7. The comprehensive examination and the M.S. thesis defense will begin with an open session in which the candidate gives a presentation on his/her research and the members of the audience, including the committee, can ask questions regarding the contents of the presentation and the research work the candidate has carried out towards his/her Masters requirement. Non-examination-committee persons in attendance will then be asked to leave the examination room and, in a closed session, the committee will examine the candidate on the content of the thesis as well as other relevant material. The candidate will then be excused and the committee will discuss the performance of the candidate on the exam and the contributions of the thesis and will vote to pass or fail the candidate in the examination. Approval of a student's performance on the thesis defense and comprehensive exam requires three (3) positive votes, or seventy-five percent positive votes, whichever is greater, from the advisory committee members of a graduate student pursuing a master's degree. (https://tntech.policytech.com/dotNet/documents/?docid=1015&public=true). If the candidate passes the exam, the committee will provide the candidate with the changes, if any, that need to be made to the thesis document before its submission to the College of Graduate Studies. If the candidate fails the exam, the committee will inform the candidate of the additional work that needs to be undertaken before attempting the next examination. All forms completed and decisions taken by the committee are to be provided to the CEE department for inclusion in the student's record file.

8. During the examination, the audience as well as the graduate advisory committee shall evaluate the student's oral communication skills using the CEE Department's oral evaluation form which will be distributed by the student's major advisor.

9. The advisory committee approved copy of the thesis/dissertation must be submitted through the eTD Administrator (ProQuest) for format review no later than two weeks prior to commencement/graduation. It is advisable that the student make an appointment with a College of Graduate Studies staff member for format review consultation prior to the deadline. The final copy for publication through ProQuest must be submitted via the eTD Administrator one week prior to commencement/graduation.

10. An electronic copy of the student's thesis is to be provided to the CEE

department within 30 days of approval of the degree by the College of Graduate Studies.

M.S. Non-Thesis Option

The non-thesis M.S. program in CEE requires a minimum of thirty-four (34) credit hours of graduate course work as specified in the student's approved Program of Study. This consists of a minimum of thirty (30) credit hours of graduate-level course work, three (3) credit hours of CEE 6980-Special Topics (Project), and one (1) credit hour of CEE 6910 Graduate Seminar.

Coursework

The coursework for all CEE M.S. non-thesis option students must satisfy the following requirements:

1. At least twenty-one (21) credit-hours of the coursework must be at the 6000 level or higher. The remainder of the courses in the program of study may be at the 5000 level; however, not more than 30 percent of the courses in a student's program of study may be in dually numbered 4000 (5000) courses. Courses below the 5000 level will not be counted toward a graduate degree. Even though they may appear on the written program of study as background requirements, they are excluded from the determination of completion of degree requirements.

2. A maximum of nine (9) credit hours can be transferred from other institutions.

3. At least fifteen (15) credit hours must be CEE courses. Any deviation to this must be approved by the Chairperson of the Department and the student's graduate advisory committee.

4. One (1) credit hour of CEE Graduate Seminar (CEE 6910).

5. The CEE 6980 Special Topics course is required to demonstrate the student's ability to engage in independent learning. Non-thesis M.S. students will have to submit a project report on CEE 6980, present the project results, and pass an oral comprehensive exam.

6. A graduate student must achieve a grade of at least "C" on all graduate courses taken. No more than six (6) credit-hours with a grade of "C" can be used as part of the Program of Study.

7. An "I" is assigned when a student's performance has been satisfactory, but for reasons beyond the student's control, he/she has not been able to complete course requirements within the allotted time as determined by the instructor. Students are not required to register for the course again but must complete the original course requirements with the instructor. With approval of the instructor, a student has one (1) calendar year or until the time of graduation, whichever comes first, to remove the "I". If the "I" is not removed

within the above time limits, it is automatically changed to a Grade of "IF" and is calculated as "F". If the "I" is not in a required course, the student may be permitted to graduate if permission is granted by the advisor. In such cases, the "I" is computed as an "F" and the cumulative QPA must be at least 3.0. In extenuating circumstances, such as ill health, a student may request an exception to the one-year policy to GSEC, and must provide documented evidence of the circumstance that necessitated the delay in removing the "I" grade. The request must be approved by the instructor, advisor, departmental chair, and the dean of the college. The student's advisor or departmental chair must be present when the GSEC deliberates the request.

Fast-Track M.S. Program (TTU Policy 270)

(https://tntech.policytech.com/dotNet/documents/?docid=561&public=true)

The Fast-track M.S. Program in Civil Engineering provides an opportunity for promising CEE undergraduate students to accelerate the completion of the M.S. degree requirements by allowing students admitted to the program to accumulate up to six (6) credit hours of graduate coursework to satisfy both undergraduate and graduate degree requirements, while still pursuing their undergraduate degree. These hours can include either 4000/5000 dually-listed courses taken at the 5000-level or 6000-level courses. All courses must be taken at Tennessee Tech University. The CEE chair must approve the courses as appropriate substitutions in the undergraduate curriculum. Participation does not change the requirements for either the undergraduate or graduate program.

Eligible students must apply to the CEE Fast-track M.S. program by the end of the second term of their Junior year. Students admitted to the Fast-track CEE M.S. program will meet the following criteria:

1. Be enrolled as an undergraduate Tennessee Tech Civil and Environmental Engineering student with junior or senior standing and have completed at least 90 credit hours of course work toward a bachelor's degree by the start of the Fast-track MS program.

2. Have an overall GPA of at least 3.25 and a GPA for CEE courses of at least 3.5.

3. Be recommended by a CEE faculty mentor.

Meeting these minimum requirements does not guarantee admission to the graduate program, and in no way guarantees an assistantship. The availability of a research advisor also plays a major role in admission decisions.

Students interested in the Fast-track M.S. program should consult with the CEE Chair or CEE faculty regarding the admission process and requirements.

A student admitted into the Fast-track M.S. program will have to submit a completed

Fast-track Program Acceptance Form:
https://www.tntech.edu/graduatestudies/pdf/enrolled_student_forms/1484673719_Fast_Track_Program_Acceptance_Form.pdf.

Approval is required for the six credit-hours of courses to be taken in the program. The approval process is initiated by the student's submission of the completed form Request for Fast Track Course Credit which can be found at the webpage:
https://www.tntech.edu/graduatestudies/pdf/enrolled_student_forms/Fast_Track_Course_Credit_1.pdf.

Time Limit for Completion of M.S. Degree

(Source: http://catalog.tntech.edu/content.php?catoid=28&navoid=5755)

A graduate student in a master's program must complete all the degree-requirements within a period of six (6) consecutive years. The time limit shall be computed from and including the first semester in which credit applied to the degree is earned at Tennessee Tech University. When coursework taken at Tennessee Tech University has expired according to the established time limits for completing a graduate program, the academic unit may allow the student to validate that coursework by examination subject to regulations listed under Course Validation at https://catalog.tntech.edu/content.php?catoid=28&navoid=5755.

An appeal to these time limitations must be requested by the student and approved by the student's graduate advisory committee, department chair, Associate Dean of Engineering for Research and Innovation, and the Graduate Studies Executive Committee (GSEC).

If a master's degree student has not graduated by the end of his/her initial 18 semesters and has not been granted special approval to continue to take graduate courses and satisfy requirements within the most recent 18 semesters, the student's status will change to non-degree graduate student and all regulations pertaining to non-degree graduate students will apply. When the change to nondegree status occurs, the student's graduate committee will be considered dissolved and the special responsibilities of the faculty member who chaired the committee will be terminated. Non-degree students will not be eligible to register for thesis credits.

If the student subsequently reapplies and is admitted as a degree-seeking master's student, the time limit for completion will be computed in the same way as for others, with the period beginning with the first term in which credit applied to the degree is earned. At readmission, the student's committee is not reinstated; instead, the procedures for forming a committee are to be followed.

DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE

DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE

Admission Requirements

Master's Degree Holders

Applications to the doctoral program submitted by master's degree holders in an appropriate discipline are evaluated on several admission's criteria which are listed at the webpage https://www.tntech.edu/engineering/programs/grad/phd.php.

Bachelor's Degree Holders Seeking Direct Admission into the Ph.D. Program

Students with a bachelor's degree only in an appropriate discipline may be admitted to the Ph.D. program directly (**Direct Ph.D.**) on exceptional basis. A minimum undergraduate GPA of 3.5 on a 4.0 scale or better is required and the applicant must have a record of excellent academic performance in a civil engineering undergraduate program. The applicant's test scores, personal recommendations, and relevant work experience must indicate a high potential for success in doctoral studies and research. In addition, factors such as appropriateness of the applicant's research objectives to the research interests of the program faculty, availability of faculty to supervise the applicant's research, and prior research accomplishments of the applicant will also influence the admission decision.

Fulfilling the minimum requirement does not guarantee admission to the program. An applicant who does not meet the above minimum, but appears to have reasonable potential for success as a Ph.D. student, may be admitted with provisional standing. His/her status may be changed to full standing after satisfying requirements specified at the time of admission by the Associate Dean of Engineering for Research and Innovation, in consultation with the appropriate departmental chairperson.

If admitted with provisional standing, the student must remove all deficiencies and apply for reclassification to full standing prior to the completion of fifteen (15) graduate credit hours.

Preliminary Assessment for Definition of Program of Study

(https://www.tntech.edu/engineering/programs/grad/phd.php - under Program of Study)

Each doctoral student's advisory committee shall formally meet with the student to make an objective assessment of the student's knowledge relative to the field of study. The program of study should reflect the findings of this assessment. The Program of Study based on this assessment must be completed before the end of the second semester of enrollment for the degree or completion of 15 credit hours of graduate courses, whichever comes first.

A form indicating the date of this meeting and members of the Advisory Committee in attendance shall be transmitted along with the program of study to the Associate Dean of Engineering for Research and Innovation. This form can be found on the College of Engineering and/or CEE department website.

Program of Study (TTU Policy 271)

(https://tntech.policytech.com/dotNet/documents/?docid=1015&public=true)

A doctoral student is required to complete and file a program of study form with the College of Graduate Studies before the end of the semester in which fifteen (15) Credit Hours will be earned as a doctoral student. If this requirement is not met, a hold will be put on the student's registration until it is met. If changes in an approved program of study are required or desired, a substitution form should be filed by the student with the College of Graduate Studies Office.

Each proposed program of study must be approved by the student's advisory committee, the departmental chairperson or program director, the dean or associate dean of the respective college, and the associate dean of the College of Graduate Studies. The review by the chair of the CEE department will be to ensure that the proposed program of study satisfies departmental policies and guidelines before approving it. Thus, if a Program of Study includes independent/directed study courses, such as CEE 6900/7970/7980, a list of topics covered or expected to be covered in those courses shall be attached to the Program of Study. If such a course is used as a substitute for a course in a Program of Study, the list of topics shall accompany the Substitution Form.

Degree Requirements

(http://catalog.tntech.edu/preview_program.php?catoid=28&poid=3488)

(https://www.tntech.edu/engineering/programs/grad/phd.php)

Master's Degree Holders Admitted to the Ph.D. Program

The general requirements for the Ph.D. degree in engineering with Civil Engineering as the field of specialization are as follows:

1. A minimum of 50 credit-hours of approved course work and doctoral research and dissertation that satisfies the following requirements must be completed:

    a. A minimum of 18 credit hours of course work beyond the master's degree, including a minimum of six credit-hours of 7000-level courses acceptable to the student's advisory committee. No 5000-level courses are to be used to meet the minimum requirements for course work, and no directed study courses (CEE 7980) are to be used to meet the minimum 7000-level course requirement.

    b. The equivalent of 24 credit hours of doctoral research and dissertation (CEE 7990) that makes a significant contribution to the state of knowledge or to the art of the engineering discipline, is required; not more than 9 credit hours may be earned in a particular semester.

    c. Two credit hours of CEE Graduate Seminar (CEE 6910).

d. An additional 6 credit-hours of either graduate level course work or research experience as per the policy of the student's major department. CEE's policy on these additional six credit-hours is for them to be assigned to 6000- or 7000-level graduate courses (directed study and special topics are acceptable).

2. Residence of four semesters beyond the master's degree, with at least two semesters in continuous residence, is required. All requirements, including the dissertation, must be completed within a period of eight consecutive year.

3. Maintenance of a minimum quality point average of 3.0 and adherence to the general regulations of the College of Graduate Studies are expected (https://catalog.tntech.edu/content.php?catoid=28&navoid=5754).

4. All students in the program must follow a plan of study and research developed in conjunction with an advisory committee, satisfactorily complete a comprehensive examination, achieve candidacy, and satisfactorily defend the dissertation.

Sometimes a master's-level student takes more graduate-level courses than are required for the degree because the student is expecting to continue on to the Ph.D. program and hopes to use the extra courses to satisfy the Ph.D. coursework requirement. When this is the case, the student can request when registering for the course(s) that the course(s) be "banked" for the Ph.D. program. If the student lacks no more than 12 semester hours on the master's degree, he/she may accumulate a maximum of 9 semester hours that may be applied toward the Ph.D. When this is the case, the student's advisory committee must initiate approval via memo with consensus of the Departmental Chairperson, Dean of the College of Engineering, and the Dean of College of Graduate Studies. Banked courses then appear on the student's transcript as courses taken for the Ph.D. rather than being shown as a part of his/her M.S. program. Banking a course does not guarantee admission to the Ph.D. program, or, if admitted, that the student's Ph.D. advisory committee will approve the course as part of the student's Ph.D. Program of Study.
(Source: https://www.tntech.edu/engineering/pdf/grad/banking-course-form.pdf)

Bachelor's Degree only Holders Admitted Directly into the Ph.D. Degree Program

(http://catalog.tntech.edu/preview_program.php?catoid=28&poid=3488)

A student admitted directly to the Ph.D. program with a bachelor's degree only from a non-ABET accredited program must successfully complete a qualifying examination based mostly on undergraduate material before the end of the second semester of enrollment. Students with a Bachelor of Science (B.S.) degree from ABET-accredited programs are exempted from this examination. M.S. students without an ABET-accredited B.S. degree that switch to direct Ph.D. will have to take a qualifying exam through a formal process established by the department. This process should be managed by the Graduate Committee of the department and should include at a minimum an examination of the student's fundamental knowledge in the CEE sub-

discipline in which student is specializing. Based on the student's performance on the qualifying examination, the student may be (i) permitted to continue in the doctoral program, or (ii) advised to transfer to an M.S. degree program in an appropriate discipline in the college, or (iii) recommended for termination from the graduate program of the college.

If permitted to continue in the doctoral program, the student, as described elsewhere in the graduate catalog, will select a research advisor and form an advisory committee. A program of study must be submitted with a minimum total of seventy-four (74) credit hours of academic work, beyond baccalaureate work, consisting of course work and dissertation work and subject to the following:

1. The program of study should include a minimum of forty-four (44) credit hours of appropriate graduate level course work consisting of a minimum of six (6) credit hours at the 7000-level and a maximum of nine (9) credit hours at the 5000-level, acceptable to the student's advisory committee. No directed study courses (CEE 7980) are to be used to meet the minimum requirement of six credit-hours of 7000-level courses.

2. An additional six (6) credit hours of either graduate level course work or research experience as per the policy of the student's major department. CEE's policy on these additional six credit hours is for them to be assigned to 6000- or 7000-level graduate courses (directed study and special topics are acceptable).

3. A minimum of 24 credit hours of doctoral research and dissertation that makes significant contribution to the state of knowledge and the art of the engineering profession, is required; no more than nine (9) credit hours of doctoral research and dissertation may be registered for in a particular semester

4. Two credit hours of CEE 6910 CEE Graduate Seminar.

The other requirements, such as residency, grade point average, comprehensive exam, and dissertation are the same as those for students admitted with a master's degree, as described above.

Bachelor's Degree only Holders Admitted Directly into the Ph.D. program and Earning a non-Thesis MS En Route

(https://www.tntech.edu/engineering/programs/grad/phd.php)

All the conditions stated above for Bachelor's degree only holders admitted directly into the PhD program are applicable here. In addition:

1. Nine (9) credit hours will count toward the non-thesis MS degree and toward the Ph.D. degree.

2. Since the departmental non-thesis MS requires three (3) credit hours of a non-thesis project course, those three (3) credit hours can be counted as three (3) credit hours of Research and Dissertation toward the Ph.D. degree.

3. Six (6) credit hours of M.S. coursework can be counted toward the Ph.D. coursework.

Comprehensive Examination and Admission to Candidacy

(https://www.tntech.edu/engineering/programs/grad/phd.php)

The comprehensive examination will consist of a written part and an oral defense of the written research proposal. The written examination will consist of several parts as appropriate to the major discipline and the research area. This examination will test the student's breadth of knowledge in the discipline, depth of knowledge in selected areas, and the ability to integrate the knowledge acquired from several courses. This examination must be given after the student has completed at least eighty (80) percent of the coursework beyond the master's degree, as prescribed in the program of study. However, the written comprehensive examination should be completed before the end of the semester following completion of the coursework prescribed in the program of study. The extension of this deadline is possible with the appropriate justification. A student desiring an extension shall make a request in writing to the Associate Dean of Engineering for Research and Innovation. The request must include justification and a schedule for completion. If the student is not satisfied with the decision of the Associate Dean, the decision may be appealed to the Engineering Graduate Committee, with the Dean of Engineering substituting for the Associate Dean as chair of the committee.

All parts of the written examination should be completed within a period of two weeks. Other details of this examination, including format, content, method of evaluation and timing, will be left to the discretion of the committee. All voting members of the committee should participate in evaluating the student's performance in the written parts of the examination.

The written research proposal should, as a minimum, consist of the development of the research problem from the extant knowledge in the area, the approach and methodology to be followed, the expected original contribution to the extant knowledge and the expected time-line for the completion of the research. The student should submit copies of written proposal to the committee within thirty (30) days from the date of taking the final part of the written examination, and the proposal defense will be scheduled shortly thereafter. The student will be informed of the results of the entire comprehensive examination (written part and proposal presentation) at the end of the defense of the research proposal. On passing the entire comprehensive examination, the student becomes an official candidate for the doctoral degree.

Normally, a student not passing any part of the comprehensive examination will not be permitted to continue in the doctoral program. However, at the request of the student, the committee may agree to give a second chance to the student to pass that part of the written examination that he/she did not pass. The committee may prescribe additional academic work to be undertaken by the student prior to making the second attempt. No student will be permitted to continue in the program if he/she does not successfully complete all parts of the comprehensive examination after the second attempt.

Dissertation and Defense

A doctoral student is required to participate in a formal defense of his/her dissertation. The following requirements are applicable.

1. Prior to scheduling the dissertation defense, the doctoral student must submit the dissertation Certificate of Approval page to the College of Graduate Studies for format review and approval.

2. The doctoral student is responsible for scheduling his/her dissertation defense with his/her advisory committee to allow enough time to submit the defense results to the College of Graduate Studies by the College of Graduate Studies calendar deadline to ensure graduation eligibility.

3. The student should allow ample time for the committee to review the dissertation, usually no less than two (2) weeks.

4. A doctoral student's dissertation defense is open to the public.

5. All of the doctoral student's advisory committee members are required to attend the dissertation defense.

6. A minimum of eighty percent positive votes is required from the advisory committee members of a doctoral student in Engineering.

7. Failure to submit the doctoral student's dissertation defense results to the College of Graduate Studies by the posted deadline on the College of Graduate Studies calendar will result in the doctoral student's ineligibility to graduate.

8. The College of Graduate Studies requires all graduate students to follow the Guide to the Preparation of Theses and Dissertations.

9. The College of Graduate Studies will review the doctoral student's dissertation for formatting to ensure the dissertation adheres to the Guide to the Preparation of Theses and Dissertations. The College of Graduate Studies will not review the paper's content, spelling, or accuracy of the citations.

10. Once the doctoral student's signed advisory committee Certificate of Approval page has been submitted to the College of Graduate Studies, the graduate student must submit the dissertation into the electronic publication system ProQuest. The dissertation must be submitted by the deadline posted on the College of Graduate Studies calendar, absent good cause, or it will result in the graduate student's ineligibility to graduate.

11. The graduate student's failure to complete the dissertation review and formatting process with the College of Graduate Studies by the posted deadline on the College of Graduate Studies calendar will result in the graduate student's ineligibility to graduate.

Graduate Student Advisory Committee Formation and Responsibilities

(Source: Tennessee Tech University Policy No. 271, Section IV, Part M https://tntech.policytech.com/dotNet/documents/?docid=1015)

1. The chairperson of the department or his/her designee is responsible for advising the doctoral student during the first semester, if the student has not decided on an academic/research advisor. Registration for Research and Dissertation will not be permitted during the first semester of enrollment.

2. A doctoral student, in consultation with the departmental chairperson or doctoral student's research advisor, will determine the formation of the advisory committee as part of the Program of Study. A minimum of five (5) advisory committee members is required for the doctoral program in Engineering. The student's advisory committee members shall represent each of the areas in which the student expects to study, with two (2) members having background in the major area. The graduate student must have at least one (1) committee member with adequate background and research interests in the area in which the student has proposed a research objective. The committee must consist of at least five members of the TTU graduate faculty and must be chaired by a member of the Department of Civil and Environmental Engineering. If necessary, the advisory committee may be co-chaired. If a student is not able to identify a sufficient number and type of faculty who are suitable and willing to serve on his/her advisory committee, the student will be advised by the Dean that he/she should either change his/her area of research interest to more closely match those of the available faculty or consider selecting another major. Failure to be able to form a committee is a cause for transfer to non-degree status. Further regulations concerning the membership, appointment, and responsibilities of the advisory committee are given in other sections of the catalog, and in College of Graduate Studies Policy 282.

3. A doctoral student's advisory committee shall be appointed during the student's first semester, but no later than the semester in which 9 credit-hours of course-work are to be completed. Failure to form a graduate advisory committee within the required time will result in a registration hold.

4. After the formation of the committee, each committee-member is expected to review the student's proposed program of study and to approve it or make recommendations to improve it prior to approving it.

5. Each member of the committee is expected to assist in the conduct of a comprehensive examination to ensure that the student has at least a satisfactory knowledge of the subject matter covered in the program of study and to review the student's dissertation prior to the defense; to determine the validity of the conducted research and whether it makes significant original contributions to the CEE sub-discipline.

6. The graduate student is responsible for submitting to the College of Graduate Studies any change to his/her advisory committee.

Time Limit for Completion of Ph.D. Degree

A graduate student in a doctoral program must complete his/her Ph.D. within a period of eight (8) consecutive years. Time limits shall be computed from and including the first term in which credit applied to the degree is earned.

A successful appeal to this limitation would result in an extension of three semesters granted by the Graduate School Executive Committee upon recommendation of the student's graduate advisory committee and departmental chairperson. Further appeals will not be considered. With approval of the advisory committee and departmental chairperson, a student may continue to take graduate courses and may file a new Program of Study to accommodate the additional credit which would result in degree requirements being satisfied within the most recent 27 semesters at the time of graduation.

If a student has not graduated by the end of his/her initial 27 semesters and has not been granted special approval to continue to take graduate courses and satisfy requirements within the most recent 27 semesters, the student's status will change to non-degree graduate student and all regulations pertaining to non-degree graduate students will apply. When the change to non-degree status occurs, the student's graduate committee will be considered dissolved and the special responsibilities of the faculty member who chaired the committee will be terminated. Non-degree students will not be eligible to register for research and dissertation credit.

If the student subsequently reapplies and is admitted as a degree-seeking doctoral student, the time limit for completion will be computed in the same way as for others, with the period beginning with the first term in which credit applied to the degree is earned. At readmission, the student's committee is not reinstated; instead, the usual procedures for forming a committee are to be followed.

CHECKLISTS

The checklists below are provided for students and their primary advisors to ensure the timely progression of students through the graduate program.

Master's (M.S.) Degree Checklist

- **Reclassification:** This is necessary if a student was admitted on Provisional Standing. It must be completed before admission to candidacy may be declared. A hold will be placed on the student's registration if full standing has not been achieved by the time 15 semester hours have been completed. Forms are available on the website of the College of Graduate Studies.
- **Appointment of an Advisory Committee/Program of Study/Admission to Candidacy:** This form should be initiated during the semester in which 9 credit hours will be completed. A hold will be placed on the student's registration if this form has not been filed by the time 15 credit hours have been completed. Forms are available on the website of the College of Graduate Studies.
- **Thesis Proposal:** The student's research proposal should be submitted to the advisory committee for approval and recommendations. A proposal presentation must be scheduled with the advisory committee.
- **Application for Graduation:** This form is initiated by the student by the end of the first week of the semester in which conferral of the degree is expected. All of the above steps, plus any course substitutions, should be completed prior to application. Forms are available at the College of Graduate Studies website.
- **Comprehensive Examination/Thesis Defense:** The student's advisory committee should schedule the examination/defense. The results must be submitted to the Graduate School at least three weeks prior to graduation. The form for reporting the results is available at the College of Graduate Studies website.
- **Thesis Preparation Requirements:** The College of Graduate Studies website https://www.tntech.edu/graduatestudies/etd/formatting/index.php has the format requirements for theses.
- **Thesis Approval and Submission to Advisory Committee:** The student's thesis must be submitted to his/her advisory committee in preliminary form at least two weeks prior to defense. The final version of the thesis is due at least two weeks prior to graduation to the College of Graduate Studies. The graduate student is expected to consult frequently with his/her major advisor when preparing the thesis. The only revisions to be made after submission to the advisory committee should be those requested by the advisory committee.
- **Thesis Submission to ProQuest:** The advisory committee approved copy of the thesis/dissertation must be submitted through the eTD Administrator (ProQuest) for format review no later than two weeks prior to commencement/graduation. It is advisable that the student make an appointment with a College of Graduate Studies staff member for format review consultation prior to the deadline. The final copy for publication through ProQuest must be submitted via the eTD Administrator one week prior to commencement/graduation.
- **Submit Thesis to CEE:** An electronic copy of the thesis must be submitted to the CEE office.
- **Graduation.** The student is required to be present for the conferral of the degree unless written notification is on file in the College of Graduate Studies. Students graduating in absentia may have their diplomas mailed to them. They, however, have to assume the risks associated with damage to the delivered diploma or delivery to a wrong address.

Doctor of Philosophy (Ph.D.) Degree Checklist

- **Preliminary Assessment:** Each doctoral student's advisory committee shall formally meet with the student to make an objective assessment of the student's knowledge relative to the field of study. The program of study should reflect the findings of this assessment. The Program of Study based on this assessment must be completed before the end of the second semester of enrollment for the degree or completion of 15 credit hours of graduate courses, whichever comes first. A form indicating the date of this meeting and members of the Advisory Committee in attendance shall be transmitted along with the program of study to the Associate Dean of Engineering for Research and Innovation.

- **Forming Advisory Committee:** Each Ph.D. student's advisory committee will have a minimum of five (5) voting members with at least three members from the student's major department and at least one (1) member from outside the department. The Associate Dean of Engineering for Research and Innovation will serve as an ex officio, nonvoting member. The advisory committee is permitted to have more than the minimum number required. Normally one faculty member will serve as the chair. For more information, the student should refer to the Graduate Catalog at https://catalog.tntech.edu/content.php?catoid=28&navoid=5732 and the university's policy document concerning formation of advisory committees at https://tntech.policytech.com/dotNet/documents/?docid=1015&public=true.

- **Meetings of the Advisory Committee:** The advisory committee will normally meet several times during the student's tenure to review progress made and provide the student with advice. At a minimum, the committee shall meet for the following actions at the appropriate times:

    - To decide on the Program of Study
    - To decide on the administration of the comprehensive examination
    - To evaluate the student's performance on the comprehensive examination including the approval of the research proposal
    - To approve the research work of the student and the written dissertation.

  The chairperson of the advisory committee shall call the meeting of the committee for the above and other such purposes as needed. Relevant information, such as copies of Program of Study, proposal, draft of dissertation, etc. must be provided to all committee members sufficiently in advance of the meeting. The outcome(s) of each meeting should be documented by the chair of the committee and copies sent to the department chair and to the Associate Dean of Engineering for Research and Innovation.

- **Program of Study:** The student's Program of Study should be filed by the time he/she completes 15 course credits towards the doctoral degree.

- **Comprehensive Examination:** The comprehensive examination will consist of a written part and the presentation and oral defense of the research proposal. The written examination will consist of several parts as appropriate to the research area. This examination will be to test the student's breadth of knowledge in the discipline, depth of knowledge in selected areas, and the ability to integrate the knowledge acquired from several courses. This examination must be given after the student has completed at least eighty (80) percent of the coursework beyond the master's degree, as prescribed in the Program of Study. However, the written comprehensive examination should be completed before the end of the semester following completion of the coursework prescribed in the Program of Study. The extension of this

deadline is possible with the appropriate justification (refer to the Graduate Catalog for details).

- **Finish Research and Write Dissertation.** The Ph.D. program must be completed within 8 years of admission. The graduate student is expected to consult frequently with the major advisor during dissertation preparation. At the time the final draft has been completed, the thesis should be in typed form. The only revisions to be made should be those required by the advisory committee. The student should allow at least two weeks for the committee to study the dissertation.
- **Dissertation Preparation Guidelines:** The College of Graduate Studies provides the guide to preparing a dissertation at https://www.tntech.edu/graduatestudies/etd/index.php under the heading "Formatting your thesis/dissertation".
- **Defend Dissertation.** A minimum of three weeks prior to the defense, a complete, final draft of the dissertation must be submitted to each member of the Graduate Committee. The dissertation must conform to the university guidelines as set in the Graduate Catalog. The date of Ph.D. defense should be publicized openly through the CEE Office and the College of Engineering in a manner as warranted for a public hearing. The defense has two components: 1) a public presentation of the dissertation contents, and 2) an oral examination by the Graduate committee. Part 2) may be open to only the committee members.
- **Dissertation Submission to ProQuest:** The advisory committee approved copy of the thesis/dissertation must be submitted through the eTD Administrator (ProQuest) for format review no later than two (2) weeks prior to commencement/graduation. The final copy for publication through ProQuest must be submitted via the eTD Administrator one (1) week prior to commencement/graduation.
- **Submit Dissertation to CEE:** An electronic copy of the approved final version of the dissertation must also be submitted to the CEE office.
- **Submit Technical Paper(s) to Peer-reviewed Scholarly Journal(s).** Prior to the dissertation defense, it is recommended that at least one technical paper concerning the dissertation be submitted by the student and his/her major advisor and other members of the Committee who have significantly contributed to the student's research, to an appropriate peer-reviewed professional journal.
- **Graduation.** Student is required to be present for the conferral of the degree unless written notification is on file in the Graduate School. Students graduating in absentia may have diplomas mailed and assume the risks involved for faulty mail delivery of diploma.

TIPS ON PREPARING A RESEARCH PROPOSAL

TIPS ON PREPARING A RESEARCH PROPOSAL

Tips on Preparing a M.S. Research Proposal

After considering their research interests, students must discuss their research idea(s) with their advisor. This will initiate a process that eventually culminates in a written proposal for review by the student's graduate committee.

It is recommended that the research proposal address the items below:

1. **Background and Research Objective(s):** Provide the background to the technical issue(s)/question(s) of research interest. Explicitly state what the objectives of the proposed research are.

2. **Previous Research on the Topic**: Provide a comprehensive review of studies relevant to the research topic.

3. **Methodology:** Define and describe in detail the steps of the procedure(s) to be followed to address the research objective(s).

4. **Anticipated Findings**: Describe what you hope to learn from your research and what sort of impact it will have on the state of practice/art in the sub-discipline of civil engineering**.**

5. **Bibliography.** List the sources for information in your research. The bibliography should conform to the standard format as outlined the graduate thesis preparation guideline.

6. **Schedule:** Create a timeline showing the proposed start-date and end-date of the research and its documentation and, in-between, the dates at which major research tasks will be completed.

Tips on Preparing a Ph.D. Research Proposal

It is recommended that the doctoral research proposal address the following items:

1. **Background and Dissertation Objectives:** Provide the background that motivates the technical issue(s)/question(s) of research interest. Explicitly state what the objectives of the proposed research are.

2. **Previous Research on the Topic**: Provide a comprehensive review of studies relevant to the planned research topic, identifying their weaknesses, strengths, and gaps in the current state of understanding to provide context for the proposed research.

3. **Methodology.** Define and describe in detail the steps of the procedure(s) to be followed to address the research objective(s). This should include, where applicable, methods for the collection of data (experiments to be conducted), and mathematical methods and graphical tools that will be employed.

4. **Anticipated Findings.** Describe what you hope to learn from your research and what sort of impact it will have on the state of practice/art in the sub-discipline of civil engineering**.**

5. **Bibliography:** List the sources of information in your research. The bibliography should conform to the standard format as outlined in the graduate thesis preparation guideline.

6. **Schedule:** Include the start date, key deadlines for completion of various research tasks, and the anticipated completion date of the dissertation.

PREPARING FOR Ph.D. DISSERTATION DEFENSE

PREPARING FOR DISSERTATION OR THESIS DEFENSE

The Ph.D. dissertation defense and the M.S. thesis defense represent the culmination of the student's sustained and prolonged effort into scientific inquiry to uncover knowledge fundamental in nature. Naturally, this requires that the student expend an adequate amount of time and effort to the preparation of the defense itself to convince the committee members and the general audience that the work he/she has completed justifies the award of the pursued degree (Ph.D. or M.S.)

At a minimum, it is recommended that the student follow the guidelines below when preparing for the defense:

1. Publicize the defense date at least 2 weeks before the scheduled date.

2. During the presentation, emphasize how the research contributes to the body of knowledge in the relevant field.

3. The duration of the presentation should not exceed 60 minutes for a Ph.D. dissertation defense or 30 to 40 minutes for a M.S. thesis defense.

4. Have practice sessions with your major advisor and, if possible, with the graduate seminar class.

5. Continually critique the presentation and make appropriate revisions to it until you are comfortable with it.

6. Seek advice about presentations from your major advisor and committee members. See also the *Tips for Creating an Effective Presentation* section of this handbook.

TIPS ON WRITING AN EFFECTIVE THESIS/DISSERTATION

TIPS ON WRITING AN EFFECTIVE THESIS/DISSERTATION

The thesis/ dissertation is the ultimate educational product. It reflects the training a student received in technical, analytical and writing skills. The CEE Department encourages students to strive for the highest standards in thesis/dissertation writing.

Generally, the following questions should be asked by the student when he/she embarks on the task of writing a dissertation:

1. Is it well written and organized?
2. Does it connect all components and chapters in a seamless way (like reading a novel)?
3. Does it exhibit mature and independent thinking?
4. Does it have a point of view, and a strong, confident independent authoritative voice?
5. Does it ask new questions or address an important problem?
6. Is it thoroughly researched?
7. Does it have rich data from multiple sources?
8. Is it publishable in top-tier journals?
9. Does it have conclusions that tie the whole thing together?
10. Does it push the discipline's boundaries and open new areas of research?

While all the above points may not be possible to achieve simultaneously, it should be the student's ambitious goal to strive for all of the above as much as possible with active support from his/her major advisor.

In writing the dissertation, the following sequence of components are suggested for the student. Note: this is only meant to be a guide. Students are expected to consult with their advisors on the final lay-out of their dissertation.

Component 1: Introduction

The introduction should include:

i. Problem statement
ii. A clear research question to be addressed
iii. Motivation of the study
iv. Context in which the question arises
v. A roadmap for seeking answers to the question

Component 2: Literature Review

i. Should be comprehensive and up to date
ii. Should show a command of the literature
iii. Should contextualize the problem being studied

Component 3: Theory

The theory that is applied or developed:

i. Should be appropriate
ii. Should be logically interpreted
iii. Should be well-understood
iv. Should align with the question at hand
v. Student should also discuss strengths and limitations of the theory used

Component 4: Methods

The methods applied or developed:

i. Should be appropriate
ii. Should be described in detail (so that a reader can reproduce them)
iii. Should be in alignment with the question addressed and the theory used
iv. Should reflect an understanding of the method's advantages and disadvantages

Component 5: Results and Analysis

The analysis should be:

i. Appropriate
ii. Aligns with questions or hypotheses raised
iii. Shows sophistication
iv. Presented in light of study's limitations

Component 6: Discussion and Conclusion

The conclusion should:

i. Summarize findings
ii. Provide perspective on the findings
iii. Tie everything together
iv. Discuss the study's strength and weaknesses

A recommended resource for preparing a Ph.D. dissertation can be found in Chapter 16 of the book *How to Write and Publish Engineering Papers and Reports* by Herbert B. Michaelson (3rd Edition, Oryx Press) [Note: this book is usually available at the TTU Book Store].

TIPS ON WRITING AN EFFECTIVE TECHNICAL PAPER (PUBLISHABLE)

TIPS ON WRITING AN EFFECTIVE TECHNICAL PAPER (PUBLISHABLE)

Compilation sources:

- https://www.tulane.edu/~lamp/whiteside.pdf
- https://cstw.osu.edu/sites/cstw.osu.edu/files/science-of-writing.pdf

A good research paper should have a clear statement of the problem the paper is addressing, the proposed solution(s), and results achieved. It describes clearly what has been done before on the problem, and what is new. The goal of any technical paper is to describe novel technical results.

It is recommended that the student try to focus on the following while writing the paper:

- Describe the results in sufficient details to establish their validity;
- Identify the novel aspects of the results, i.e., what new knowledge is reported and what makes it non-obvious; and
- Identify the significance of the results: what improvements and impact do they suggest.

TIPS FOR CREATING AN EFFECTIVE PRESENTATION

TIPS FOR CREATING AN EFFECTIVE PRESENTATION

Compilation sources:

- https://thesishub.org/12-tips-for-creating-effective-presentations/;
- http://sites.utexas.edu/ecoadvising/files/2018/02/Tips-for-Making-a-Good-Research-Presentation-FINAL.pdf

An effective presentation is key to the advisory committee and general audience gaining a full appreciation of the accomplishments of a student in their research. Therefore, adequate time must be devoted to its preparation.

The key word here is **preparation**.

1. **Plan well in advance**. Write a first draft then leave it overnight before working on later drafts. If possible try to have everything ready a few days before you give the presentation (except perhaps for fine tuning).

2. **Organize your material carefully**. Usually, it is essential to begin with some introductory or background material to prepare the audience and to explain the motivation for the work. The entire presentation should be clearly and logically organized.

3. **Pay attention to details**. Careless mistakes, such as misspelled words and poorly aligned text or graphics, can distract your audience from your presentation and reflect negatively on your work. Use spell-checking and grammar tools to proofread your presentation. Include slide numbers to help your audience refer to particular items during the question and answer session.

4. **Differentiate between main points and secondary issues**. For presentations of long duration, a summary or a review of the key points at the end will serve the audience well.

5. **Design your visuals carefully to effectively convey your message**. There is a wide range of "effective" visuals, depending on the style of the speaker, the content of the presentation, and the audience. Some speakers use very sparse visuals effectively, filling in gaps verbally, while others use visuals that are essentially complete and can be understood independently of the speaker. Most speakers settle for something in between these two extremes. Use what best suits your style of presentation.

6. **Practice** your presentation, preferably in front of friends or family.

7. **Ask for feedback**. Check the duration of your presentation. Does it fit comfortably within the time allotted? Running out of time can adversely affect what would otherwise have been a good presentation.

8. **Try not to be too anxious about giving the presentation**. Remember that most people feel nervous about giving presentations, but most audiences are well aware that giving a presentation can be stressful and they are forgiving of errors. Often only the speaker knows when there has been a slight omission or a minor change during the talk. Lots of rehearsal before the presentation will help to reduce anxiety.

9. **Speak clearly** and with sufficient volume to be heard throughout the room (this applies even if you are using a microphone).

10. **Face the audience and establish eye contact**, especially during the most important parts of the presentation. Some people find it helpful to identify a few friendly faces in the audience. Often a person in the audience will not, smile or give some form of helpful feedback.

11. **Try to avoid mumbling**, seeming nervous or confused, looking away from the audience for long periods, or generally giving the impression that you would rather be anywhere but here giving the presentation (even if it is true!). It is also advisable to avoid too many colloquialisms or an overly casual conversational style. For technical presentations a slightly more formal style is common and (partly because audiences have come to expect this style of presentation) is more likely to convince the audience that the speaker knows the material.

12. **Remember**, whenever you make a presentation you are also presenting yourself. If you present your ideas clearly and persuasively, with self-assurance, skill, and professionalism, you and your presentations are likely to be much more effective.

APPENDIX 1
USEFUL INFORMATION FOR DOCTORAL COMMITTEE CHAIRPERSONS

Useful information for chairs of doctoral committees can be found at the webpage with URL: https://www.tntech.edu/engineering/pdf/grad/phd_committee_info.pdf