

CIVIL ENGINEERING GRADUATE HANDBOOK

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2010

(Approved by Faculty on November 27, 2007)

(Updated April 6, 2010)

(Updated December 2014)

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 to the graduate student and advisor on thesis/dissertation writing and useful tips towards successful and timely completion of the graduate degree in Civil and Environmental Engineering. This handbook represents a convenient supplement to the official University and College policies enunciated in the TTU Graduate Catalog.

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HOW TO APPLY FOR GRADUATE SCHOOL

HOW TO APPLY FOR GRADUATE SCHOOL

Interested students should apply through the Graduate School. For application forms contact: Graduate Admissions, Box 5036, Tennessee Tech University, Cookeville, TN 38505, U.S.A. or call: +1-931-372-3233 or email gradstudies@tntech.edu. All relevant information is available from the Graduate School and can be found at <http://www.tntech.edu/graduatestudies/>

All admission and funding decisions are based upon the application submitted by the student. The application process is described on the TTU Graduate Studies website <http://www.tntech.edu/graduatestudies/>, which can also be accessed from the CEE website. Admission criteria for the College of Engineering are summarized in the [graduate catalog](#). CEE uses the admission criteria defined by the College of Engineering.

It is recommended that students review the CEE website regarding faculty research interests and expertise in order to assess their compatibility to the CEE graduate research program.

MASTER OF SCIENCE DEGREE

MASTER OF SCIENCE DEGREE

Admission to the M.S. Program

The minimum requirements for admission to the Civil Engineering M.S. program are the same as those for any M.S. program in the College of Engineering (<http://catalog.tntech.edu/content.php?catoid=24&navoid=4601>). These requirements are stated under the College of Engineering listing. The program is designed for graduates of approved undergraduate programs. Thus a baccalaureate degree in civil engineering is required for full standing. Applicants that have an undergraduate degree in a closely related field will be evaluated on a case-by-case basis and may be admitted to full standing upon completion of identified background courses.

General Requirements

(Note: Many requirements overlap with general requirements for Ph.D. Degree; For Non-thesis option refer also to page - 14)

1. A CEE graduate student receiving an assistantship is required to register for a minimum of 9 hours and a maximum of 12 hours during Fall and Spring semesters, and a minimum of 3 hours and a maximum of 12 hours during Summer semester. To meet the above load requirements, students may take thesis/dissertation hours beyond the regular course requirement. For College of Engineering graduate students, 3 hours will be considered as full load during summer semester.
2. For a new graduate student, the CEE Chairperson (or designee) will act as the student's advisor until the graduate committee is formed.
3. Specific instances of any proposed course such as CEE 6900 (Special Problems), CEE 7970 (Selected Topics), CEE7980 (Directed Study) shall be initiated at the emphasis group level and be approved by the CEE Graduate Affairs Committee.
4. The CEE Department Chairperson reviews the Program of Study submitted by a CEE graduate student (M.S. or Ph.D.) to ensure that it satisfies the departmental policies and guidelines.
5. 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.
6. A copy of the appointment of advisory committee, Program of Study, thesis defense and examination forms are to be provided to the CEE department for inclusion in the student record file.
7. A copy of the student thesis is to be provided to the CEE department for inclusion in the CEE library within 30 days of approval of the degree by the Graduate School.

8. The comprehensive examination for the defense of a M.S. thesis will begin with an open session in which the candidate makes a presentation and the members of the audience, including the committee, ask questions regarding the contents of the presentation and the research work the candidate has carried out towards his/her Masters requirement. Members of the audience who do not belong to the examination committee are then asked to leave the examination hall and, in a closed session, the committee examines the candidate on the content of the thesis or dissertation as well as other relevant material. The candidate is then excused and the committee discusses the performance of the candidate on the exam and the contributions of the thesis/dissertation and votes to pass or fail the candidate in the examination. If the candidate passes the exam, the committee instructs the candidate on the changes, if any, needed on the thesis. If the candidate fails the exam, the committee informs the candidate regarding the additional work that the candidate shall undertake before attempting the next examination. All forms and decisions taken by the committee are to be documented and provided to the CEE department for inclusion in the student record file.

Graduate Committee and Advising

(Source: <http://catalog.tntech.edu/content.php?catoid=24&navoid=4711>)

1. The chairperson of the department or his/her designee is responsible for advising the student during the first semester. No thesis or dissertation credit registration will be permitted during the first semester of enrollment. If needed, a fast-track student may be permitted by the departmental chairperson to register for thesis credits during the first semester. The program of study should include only the minimum required credit hours of thesis (6 hours) or dissertation (24 hours). It should also include co-op credits if the student plans to do that as part of his/her curricular requirement for the degree.
2. Each student's course of study and research is directed by a committee of graduate faculty called a graduate advisory committee. The student, in consultation with the departmental chairperson, is responsible for identifying a faculty member who is willing to chair his/her advisory committee. In consultation with the chairperson of the committee, the student is responsible for identifying at least two other faculty members who are willing to serve on his/her committee. 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. The graduate student's advisory committee may be appointed during the student's first term but no later than the term in which 15 credits of course work are to be completed.

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. This step should be completed before the student registers for research and thesis credits.
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 insure 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. Unless an exception has been granted by the departmental chairperson, the dean of the college, and the Associate Vice President of Research and Graduate Studies, a graduate student who has earned at least 15 semester hours of course credit that does not have an appropriate advisory committee will not be permitted to register. After 15 semester hours have been earned, failure to form or to maintain an appropriate committee is cause for transfer of the student to non-degree status.

Program of Study

(Source <http://catalog.tntech.edu/mime/media/view/24/4843/20172018Graduate-Annual-Catalog.pdf>)

All students must complete a minimum of twenty-four credit hours of graduate course work plus a minimum of six credit hours of thesis research that satisfies the following requirements:

1. At least 21 semester credits including the thesis shall be required at the 6000 level in a thesis program for the master's degree. 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; and, although they may appear on the written program as background requirements, these courses are not figured into degree requirements.
2. A maximum of nine credit hours can be transferred from other institutions.
3. No more than three credit hours with a grade of "C" can be used as part of the Program of Study.
4. At least 15 credit hours must be CEE courses. Under certain circumstances any deviation to this must be approved by the Chairperson of the Department and the student's graduate committee.
5. **One semester hour of CEE 6910 CEE Graduate Seminar.**

Research/Thesis (for M.S. Thesis option)

1. A minimum of six credit hours of CEE 6990 Thesis Research/Thesis.
2. When a student makes satisfactory progress in research and thesis, a grade of SP (Satisfactory Progress) will be assigned for credit earned. When satisfactory progress is not 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 or dissertation credit. Refer to the TTU Graduate Catalog <http://catalog.tntech.edu/mime/media/view/24/4843/20172018Graduate-Annual-Catalog.pdf>.
3. 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=24&navoid=4713>)
4. A student can register for CEE 6990 Research and Thesis only after approval of his/her thesis proposal by his/her graduate committee.
5. A thesis draft will be submitted, through the thesis advisor, to the graduate committee at least three weeks prior to the thesis defense.
6. The date and location of the defense will be publicized through the CEE office two weeks prior to the defense. It is therefore the responsibility of the major advisor to schedule a defense date in a timely manner through prior consultation with the graduate committee and the student.
7. Students must perform satisfactorily on a comprehensive examination.

This examination is an oral examination that is held at the same time as the student's thesis defense.
8. A copy of the hand-out that the student distributes during his/her comprehensive examination must be provided to CEE Office for official records.
9. Two acceptable copies of the thesis, ready for binding, must be deposited with the Associate Vice President of Research and Graduate Studies at least one week prior to the close of the semester in which the degree is to be conferred (or at an earlier date if such is specified in the University calendar). These copies will be hardbound for library reference purposes.

Time Limit for Completion of M.S. Degree

(Source: <http://catalog.tntech.edu/content.php?catoid=24&navoid=4638>)

1. A graduate student in a master's or specialist program must complete all degree requirements within a period of six consecutive years, and in a doctoral program within a period of eight consecutive years. Time limits shall be computed from and *including* the first term in which credit

applied to the degree is earned.

2. The time limit on credits earned that can be accepted toward fulfilling the requirements for a degree is six years.
3. An appeal to these time limitations must be requested by the student and approved by the advisory committee, department chair, Associate Engineering Dean for Graduate Studies and the Graduate School.
4. A successful appeal results 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 21 semesters at the time of graduation.
5. If a masters degree student has not graduated by the end of 21 semesters (27 for Doctoral students) after entering the graduate program and has not been granted special approval to continue to take graduate courses and satisfy requirements within the most recent 21 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 to be dissolved and the special responsibilities of the faculty member who chaired the committee are terminated. Non-degree students will not be eligible to register for thesis credit.
6. If the student subsequently reapplies and is admitted as a degree-seeking master's or 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.
7. When the coursework taken by a student is too old to be included in the graduate program, the Department may allow the student to validate that coursework by examination, subject to the following regulations: i) only students who are fully admitted to the graduate program and are in good standing; ii) not more than 12 hours of total credits in a master's program may be validated; iii) only courses with fixed content are eligible for validation (independent study, research or special topics courses are ineligible); iv) only those courses still being taught are eligible for validation.

8. For validation of old coursework by examination, the student should contact the graduate school for further details.
9. A master's student may receive support during the first two calendar years after initial enrollment. This time limitation does not imply a student will receive support during his/her first two years. Whether or not a student receives support depends on the availability of funds and the suitability of the student to carry out the responsibilities associated with the support. Support beyond the stated limits requires justification, which must be approved by the Associate Dean of Engineering for Graduate Studies and Research. For details, see: <http://catalog.tntech.edu/content.php?catoid=24&navoid=4705>).

M.S. (Non-thesis Option)

An MSCE program of study with non-thesis option requires a minimum of 34 credit hours of graduate course work, as specified in the student's approved Program of Study. The program of study shall include 30 semester hours of graduate-level coursework, one semester hour of CEE 6910 CEE graduate seminars, and three semester hours of CEE 6980 Special Topics (Project Work) course. At least 15 credit hours of graduate coursework must be CEE courses. The Special Topics course will demonstrate the student's capability to engage in independent learning. Non-thesis MSCE student will have to submit a project report on CEE 6980, present the project results, and pass an oral comprehensive exam. Other departmental requirements may apply.

Fast-Track M.S. Program

The Fast-track M.S. Program in Civil Engineering will provide an opportunity for promising CEE undergraduate students to accelerate the completion of the M.S. Students must apply to the CEE Fast-track M.S. program by the end of their second Junior Term. Students must apply and take the GRE during their second senior term (one semester prior to their anticipated graduation).

Students admitted to the Fast-track CEE M.S. program will meet the following criteria: be enrolled as an undergraduate Civil Engineering student at TTU with at least Junior standing; have at least an overall GPA of 3.25; have at least a 3.5 GPA in CEE. Meeting these minimum requirements does not guarantee admission to the graduate program. In addition to the requirements for admission to the CEE Fast-track M.S. program, all requirements for admission to the CEE graduate program must also be met upon graduation.

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

DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE

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General Admission Requirements:

(Source: <https://www.tntech.edu/engineering/coe-graduate-programs/>)

(Note: For completeness, refer also to 'General Requirements' for M.S. Degree on page 8)

A graduate program leading to a Doctor of Philosophy (Ph.D.) in Engineering is offered by the College of Engineering. The Associate Dean of Engineering for Graduate Studies and Research is the head of the program. Currently, the departments of Chemical Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, and Mechanical Engineering participate in the program. The general requirements for a Ph.D. in Engineering are the same for all departments. The admission requirements, application procedures, admission to candidacy, degree requirements, and other such details may be found in the graduate catalog at

<http://catalog.tntech.edu/mime/media/view/24/4843/20172018Graduate-Annual-Catalog.pdf>.

Learning Objectives

1. The student should demonstrate breadth of knowledge in the discipline and depth in the specific area of his/her research topic.
2. The student should gain experience in doing independent academic work and research.
3. The student should demonstrate his/her ability to identify and define the research topic.
4. The research work performed by the student should contribute to the existing knowledge in the engineering field.
5. The student should demonstrate the ability to clearly communicate complex engineering and research topics in both verbal and written format.

Students Admitted with a Master's Degree

The general requirements for a Ph.D. degree in Civil Engineering are as follows:

1. A minimum of **50** credits of course work and doctoral research and dissertation as follows:
 - a. A minimum of 18 semester credits of course work beyond the masters degree, including six credits of 7000-level courses acceptable to the student's advisory committee. Additional 6 semester credits of either graduate level course work or research experience as per the policy of the student's major department. No 5000-level courses are to be used to meet the minimum requirements of 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 semester credits of doctoral research and dissertation (CEE7990) built upon the student's course of study and

making a significant contribution to the state of knowledge or to the art of the engineering profession, is required; not more than 9 credits may be earned in a particular semester. “

c. **Two semester hours of CEE 6910 CEE Graduate Seminar.**

d. CEE Policy on additional six semester credits of either course work or research experience:

The additional six semester credits should be used as 6000 or 7000 level graduate level course work only (including directed study and special topics).

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 Graduate School are expected.

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, and the Associate Vice President of Research and 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.

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 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 to be dissolved and the special responsibilities of the faculty member who chaired the committee are terminated. Non-degree students will not be eligible to register for 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.

Ph.D. Admission with BS Degree

Though the general requirement for admission to the Ph.D. program is a master's degree in an appropriate discipline, students with a BS degree may be admitted to the Ph.D. program directly if the student has a record of excellent academic performance in the undergraduate program and the applicant's test scores, personal recommendations, and relevant work experience indicate a high potential for success in doctoral studies and research. In addition, factors such as appropriateness of the applicant's goal 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.

The minimum GPA requirement for direct admission with B.S. degree can be as low as 3.5, if GRE scores and other criteria are very high. A student admitted with a B.S. degree should complete a Qualifying Examination based mostly on undergraduate material before the end of the second semester of enrollment. This examination will be aimed at determining the student's mastery of the basic concepts in the discipline and the potential for successfully conducting research at the doctoral level. 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 a M.S. Degree program in an appropriate discipline in the College or (iii) recommended for termination from the graduate program of the College. Only one attempt will be permitted for Qualifying exam. (For more details, see [http://catalog.tntech.edu/preview_program.php?catoid=24&poid=2916#Engineering, Ph.D.](http://catalog.tntech.edu/preview_program.php?catoid=24&poid=2916#Engineering,Ph.D.))

If permitted to continue in the doctoral program, the student, as described elsewhere in the document, will select a research advisor, form an advisory committee and submit a Program of Study satisfying the following requirements:

The program of study should have a minimum total of **74** semester credit hours of

academic work, consisting of course work and dissertation work, beyond baccalaureate work, subject to the following:

- The program of study should include a minimum of **44** semester credits of appropriate graduate course work consisting of a minimum of 6 semester credits at the 7000-level and a maximum of semester credits at the 5000-level, acceptable to the student's advisory committee. Additional 6 semester credits of either graduate level of course work or research experience as per the policy of the student's major department. No directed study courses at 7000-level (CEE7980) are to be used to meet the six credits of 7000-level course requirement.
- A minimum of 24 semester credit hours of doctoral research and dissertation, built upon the student's course of study and making significant contribution to the state of knowledge and the art of the engineering profession, is required; no more than nine credit hours may be earned in a particular semester.
- **CEE Policy on additional six semester credits of either course work or research experience:**
The additional six semester credits should be used as 6000 or 7000 level graduate level course work only (including directed study and special topics).

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 in the catalog.

Preliminary Assessment for Ph.D. Students in the CEE Department:

During the first semester or early second semester of enrollment, the CEE Ph.D. student must undergo an assessment of his/her strengths and weaknesses in a chosen academic area of study and field of research. The purpose of this assessment is to tailor a Program of Study of advanced course work and to prepare the student to undertake independent research. The department will assemble an evaluation team for each Ph.D. student's assessment. If possible, the evaluation team should consist of the department chairperson and the student's major professor. In certain situations, a third professor who is familiar with student's areas of study will be required as well. The Ph.D. student and the evaluators shall meet for the assessment as arranged and complete the following tasks:

Requirements for Ph.D. Students:

1. The Ph.D. student should give a short presentation to show his/her readiness on the advanced study. The presentation should include:
 - (a) The background courses taken during the M.S. study, the 6000 and 7000 level courses taken at TTU, and other advanced courses that will be taken. The student should give a brief description about the courses taken at TTU.
 - (b) Prior research projects and activities in which the student has participated.
 - (c) The publications, manuscripts, and conference presentations that the

student has developed or published.

(d) The analysis and design tools that the student has used.

2. The Ph.D. student should answer all questions posed by the evaluators clearly.
3. The Ph.D. student should propose his/her program of study.

Requirements for evaluators:

1. The evaluators should question the student on all areas relevant to his/her discipline with a view to identifying the students' strengths, weaknesses, and ability to perform independent research.
2. The evaluators should complete an Evaluation Form summarizing the student's strengths and weaknesses and also provide suggestions about the student's program of study.

Once the assessment is complete, a memo stating the results of the preliminary assessment from the department chairperson should accompany the student's program of study to the Associate Dean of Engineering for Graduate Studies. The results of this assessment will be also conveyed to the student in a memorandum from the department chairperson.

Note: Additional useful information for Doctoral Chairpersons is provided in Appendix 1 on page 55.

CHECKLISTS

CHECKLISTS

It is expected that a regular check on the following checklist by the student in consultation with his/her major advisor will ensure in smoother progression towards the degree objectives (see https://www.tntech.edu/files/cp/master_checklist.pdf). For further details, students are also expected to regularly check with the Graduate School website at <https://www.tntech.edu/graduatestudies/> for latest updates.

MASTER'S (M.S.) DEGREE CHECKLIST

1. **Reclassification:** This step is necessary if the student was admitted in 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 in the Graduate School.
2. **Appointment of an Advisor Committee/Program of Study/Admission to Candidacy:** This form should be initiated during the term in which 9 semester 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 semester hours have been completed. Forms are available in the Graduate School.
3. **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 in the Graduate School.
4. **Comprehensive Examination/Thesis Defense:** The student's advisory committee should schedule the examination/defense. Results must be submitted to the Graduate School **at least three weeks** prior to graduation. Forms are available in the Graduate School.
5. **Thesis Approval:** The student's thesis must be submitted in preliminary form **at least three weeks** prior to graduation. The **final** copies are due **at least one week** prior to graduation. The graduate student is expected to consult frequently with the major advisor during thesis preparation. At the time the final rough draft has been completed, the thesis should be in typed form. The only revisions to be made should be those suggested by the advisory committee. The student should allow ample time for the committee to study the thesis.
6. **Thesis Preparation Guideline:** The Graduate School publication *Guide to the Preparation of Theses and Dissertations* serves as the official guide for preparing all theses and dissertations. Although examples in this manual are recommended for making footnotes, endnotes, and giving bibliographical

references, each department is encouraged to use those systems of citations that are most commonly used in its own discipline or profession. Any other departure from this manual must have the prior approval of the Associate Vice President of Research and Graduate Studies. The manual may be accessed online at https://www.tntech.edu/assets/usermedia/cgs/etd/Thesis_Dissertation_Guide_Manual.pdf

6. **Submit Copy of Presentation Hand-out on Comprehensive Examination:** A copy of the hand-out that the student distributes during his/her comprehensive examination must be provided to CEE Office.
7. **Submit Copy of Thesis to CEE Office:** In addition to the two required copies of the thesis that need to be submitted to the Graduate School, the student must also submit one hard copy and one electronic copy to the CEE Office. The CEE office will cover the cost for this additional requirement. [Note: *Two acceptable copies of the thesis or dissertation, ready for binding, must be deposited with the Associate Vice President of Research and Graduate Studies at least one week prior to the close of the semester in which the degree is to be conferred (or at an earlier date if such is specified in the University calendar). These copies will be hardbound for library reference purposes*].
8. **Thesis Binding:** All copies of the thesis must be submitted on 20 pound bond paper of at least 25 percent cotton content. These copies shall be submitted unbound in separate containers. The title page of the thesis/dissertation shall carry the date (month and year) of the actual conferral of the degree. A separate one-page abstract is required at the time the thesis is submitted to the Associate Vice President of Research and Graduate Studies.
9. **Graduation.** The 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 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

1. **Preliminary Assessment:** During the first semester or early in the second semester of enrollment, the Ph.D. student must undergo an assessment of his/her strengths and weaknesses in the academic area of study and field of research. The purpose of this assessment is to tailor a Program of Study of advanced coursework and to prepare the student to undertake independent research. Each department will have its own policy on the instruments of this assessment procedure and its administration. The chairperson of the department and the chairperson of the advisory committee will work together

in advising the student in this first step which must be completed before the end of the second semester.

3. **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 for Graduate Studies and Research will serve as an ex officio, nonvoting member. The student is responsible for identifying, in consultation with the departmental chairperson and Associate Dean, a faculty member who is willing to chair his/her advisory committee. In consultation with the chairperson of the committee, the student is responsible for identifying the other faculty members required/desired and determining if they are willing to serve. 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 <http://catalog.tntech.edu/mime/media/view/24/4843/20172018Graduate-Annual-Catalog.pdf>
3. **Meetings of the Advisory Committee:** The advisory committee will normally meet several times during the student's tenure to review the progress made and counsel the student. At the minimum, the committee shall meet for the following actions at the appropriate times.
 1. To decide on the Program of Study
 2. To decide on the administration of the comprehensive examination
 3. To evaluate the student's performance in the comprehensive examination including the approval of the research proposal
 4. 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. It is expected that at a minimum, four meetings of the committee will be convened during the period of the student's study. 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 Graduate Studies.

4. **Program of Study:** The student's Program of Study should be filed by the time he/she completes 15 course credits towards doctoral studies. A minimum of 24 credits of coursework (including at least 12 credits at 7000 level) beyond the masters and 24 credits of doctoral research and dissertation are required. The Program of Study will also include the graduate level background courses taken prior to enrollment in the doctoral program (e.g.,

24 hours of course credit at the masters level). The advisory committee is responsible for developing the appropriate Program of Study considering the results of the preliminary assessment of the student's strengths and weaknesses in the academic area of study and the intended field of research.

- 5. 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. The chair of the committee will work with the other committee members and the student to schedule the written parts and the proposal presentation part in due time. 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).

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 comprehensive examination and a copy of approved version of the proposal must be retained in the CEE department office.

- 6. Finish Research and Write Dissertation.** The Ph.D. program must be completed within 8 years of admission. The optimal way towards a timely completion of research is through regular meetings with the major advisor and active consultation with committee members on research advice. The graduate student is expected to consult frequently with the major advisor during thesis preparation. At the time the final rough draft has been completed, the thesis should be in typed form. The only revisions to be made should be those suggested by the advisory committee. The student should allow ample time for the committee to study the dissertation.
- 7. Dissertation Submission:** Two acceptable copies of the dissertation, ready for binding, must be deposited with the Associate Vice President of Research and Graduate Studies at least one week prior to the close of the semester in which the degree is to be conferred (or at an earlier date if such is specified in the University calendar). These copies will be hardbound for library reference purposes. Additional copies may be required for departmental use, and each candidate may make copies for personal distribution. Each doctoral candidate is required to submit one extra copy of the dissertation for microfilming. The degree

candidate pays binding costs and microfilming costs. Authentic signatures (not photocopies) of members of the candidate's advisory committee are required on the approval sheet. Final approval of each thesis or dissertation is made by the Associate Vice President of Research and Graduate Studies using the *Guide to the Preparation of Theses and Dissertations* as the approval standard.

8. **Dissertation Preparation Guideline:** The Graduate School has published the *Guide to the Preparation of Theses and Dissertations* that serves as the official guide for preparing all dissertations. Although examples in this manual are recommended for making footnotes, endnotes, and giving bibliographical references, each department is encouraged to use those systems of citations that are most commonly used in its own discipline or profession. Any other departure from this manual must have the prior approval of the Dean of the College Graduate Studies. The manual may be accessed online at https://www.tntech.edu/assets/usermedia/cgs/etd/Thesis_Dissertation_Guide_Manual.pdf
9. **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.
10. **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 student, in consultation with his/her major advisor and committee members, must file for defense at least two weeks prior to the intended date. 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 closed only to include the committee.
11. **Submit Copy of Dissertation to CEE Office:** Other than the required number of copies of the Ph.D. Dissertation that need to be submitted to the Graduate School, student must also submit one hard copy and one electronic copy (copied on a CD) to the CEE Office. The CEE office will cover the cost for this additional requirement.
12. **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.

GRADUATE ASSISTANTS

GRADUATE ASSISTANTS

The following description has been derived from the Graduate Catalog <http://catalog.tntech.edu/mime/media/view/24/4843/20172018Graduate-Annual-Catalog.pdf>

The Department under various roles as described below may employ a graduate student.

Graduate Teaching Assistant: Graduate Teaching Assistants work under the direct supervision of a regular faculty member in activities such as helping to prepare lectures, teaching or conducting discussion sections or groups, assisting in conducting laboratory exercises, grading papers and keeping class records, or teaching physical education activities. In consultation with the supervisor, the teaching assistant works to gain teaching skills and an increased understanding of the discipline. Appointments are normally on a one-half to full-time basis. A full-time graduate assistant may be assigned to work for up to 8 contact hours per week. If a graduate teaching assistant works only non-contact hours, such as grading papers, keeping class records, helping to prepare class lectures, then the assistant is assigned 20 clock hours a week. If a graduate teaching assistant performs contact and non-contact work, the average number of hours of work per week assigned is based on the proportion of contact and non-contact hours.

Graduate Teaching Associate: Exceptionally experienced graduate students, as explained elsewhere, may be assigned primary responsibility for teaching undergraduate courses, including the assignment of final grades. The teaching associate usually carries one-fourth to one-half of a normal teaching load. A full-time graduate teaching associate may be assigned to a maximum of 6 contact hours per week in classroom or laboratory instruction.

Graduate Support Assistant: Graduate support assistants are appointed to perform various types of duties other than those related directly to teaching or research. Most commonly, these duties relate to supervisory or administrative functions of the University. Appointments are normally on a one-half to full-time basis. A full-time graduate support assistant is assigned 20 clock hours a week in the department or unit of his/her employment.

Graduate Research Assistant: Graduate research assistantships are generally financed by grant or contract funds. Students holding such appointments pursue a work and study program similar to that expected under the other types of awards. A full-time graduate research assistant is assigned to 20 clock hours a week in research activities in the department or unit of his/her employment.

ELIGIBILITY AND EMPLOYMENT STATUS

ELIGIBILITY AND EMPLOYMENT STATUS

A degree-seeking student must be admitted and/or enrolled in the Graduate School in full or provisional standing to be eligible for appointment as a graduate assistant.

1. As specified in the Tennessee Board of Regents' (TBR) Policy 5:01:01:00, page 1, "A student employee is one whose primary purpose for being at the institution is to be enrolled in an academic program of the institution." Thus, the first priority of all graduate assistants must be satisfactory progress in their scholastic programs. Collaborative efforts between graduate assistants and their supervisors should be focused on the goal of satisfactory performance in their academic program and assigned work. If, however, this is not possible for the student, the graduate assistantship must be relinquished.
2. Under the provisions of TBR Policy No. 5:01:04:10, graduate assistants shall be classified as in-state students for purposes of fees and tuition at the institutions where they are pursuing graduate studies. Accordingly, in order for a graduate student to be classified as a graduate assistant, the student must have a minimum 50% assistantship. A full-time graduate assistant is assigned to 20 clock hours per week, and receives a stipend and a waiver of out-of-state fees. A half-time assistant is assigned 10 hours of work per week and receives 50% stipend and pays 50% of in-state fees.
3. A graduate student may be offered a scholarship to cover fees and, if the student wishes to work, the student may be employed as a student worker. However, the scholarship and/or employment do not change the student's status from out-of-state to in-state for fee-paying purposes.
4. Graduate assistants are not eligible for employee benefits. The only deduction made from a graduate assistant's pay is the withholding tax. Graduate assistants must complete a W-4 form (Employee Withholding Exemption Certificate) that is available in the Office of Human Resource Services. FICA and Medicare tax are deducted if the student is enrolled for less than six (6) credit hours.

Qualifications of Graduate Assistants

The Southern Association of Colleges and Schools (SACS) specifies that graduate teaching associates who have primary responsibility for teaching a course for credit and/or for assigning final grades for such a course must have earned at least 18 graduate semester hours in their teaching fields, be under the direct supervision of a faculty member experienced in the teaching discipline, receive regular in-service training, and be regularly evaluated.

The 18-hour requirement does not apply to graduate teaching assistants who are engaged in assignments such as laboratory assistance, teaching physical education activities, attending or helping prepare lectures, grading papers, keeping class records, and conducting discussion groups. The appropriate departmental chairperson has responsibility for certifying that the 18-hour requirement is met either through coursework or by documentation that the graduate assistant meets the requirement as an exception. The appropriate notation must be placed on the Personnel Action Form (PAF) and routed through the appropriate channels.

Tennessee Technological University requires all who teach to be competent in spoken English. Each assistant (whose competency has not already been certified) will be evaluated for oral English ability by the departmental chairperson or his/her designee prior to the start of classes. Those who have been identified as not able to communicate effectively in the English language will have their assistantship revoked or will be assigned other duties. Those who have been identified as being able to communicate effectively in the English language will be so certified by the departmental chairperson (or designee) on the Personnel Action Form.

Terms of Appointment and Reappointments

The specific terms of employment of graduate assistants may be for an academic year, semester, fiscal year, or based upon a percentage of full-time assistantship. Graduate research assistants are typically appointed on a fiscal year basis (July-June). Graduate teaching assistants and graduate teaching associates begin employment one week before the start of regularly scheduled classes and end the last day of finals week. Graduate support assistants begin first day of regularly scheduled classes and end last day of classes. Graduate support assistants who start employment earlier than the beginning of the first day of regularly scheduled classes of the semester and/or end employment later than the last day of classes must be compensated for extra time worked at a rate equal to or more than the rate of their semester or academic year compensations. A graduate support assistant will be considered as a student worker and compensated as such for work performed before the beginning of the semester or after the last day of classes. Graduate support assistants who work more than 280 hours per semester must receive overtime pay. Those who work more than 40 hours per week will be compensated at the rate of one and one half.

The employment and compensation of graduate assistants must conform to the applicable provisions of the Federal Fair Labor Standards Act of the US Department of Labor. Graduate assistants who are performing satisfactorily may be reappointed, subject to available funding. The graduate student who is awarded an assistantship should ascertain from the college in which the assistantship is granted the conditions of the assistantship. The conditions may vary from college to college, or from unit to unit. In all cases of appointment and reappointment, the funding unit is responsible for notifying the graduate assistant as early as possible. When an

assistantship is not to be renewed, the graduate student should be notified in advance.

All graduate assistants/associates must sign an employment letter and have appropriate I-9 and W-4 forms on file in the Office of Human Resource Services. Under no circumstances is a graduate assistant/associate to begin work before presenting a copy of his/her signed appointment letter to his/her designated supervisor. An international student must hold and maintain a valid visa prior to the commencement of employment as a graduate assistant.

Work Assignments and Related Factors

To utilize the four categories of assistantships, the following provisions should be observed: 1. Work assignments for each type of assistantship should be as specific as possible and should be developed to reflect both the needs of the department and each graduate assistant's obligation to make satisfactory progress in his/her program. Therefore, to the extent possible, an assignment should appropriately reflect teaching hours, office hours, hours to be spent performing research or other specified tasks. In situations where the work assignment cannot be specifically described or must be changed from an initial assignment, the graduate assistant should be clearly informed before agreeing to, or continuing in the assignment.

An important part of each graduate assistant's work assignment is the fostering of professional development. Such development, plus variations in departmental needs, may result in differences in the number of hours per week for carrying out assignments. Thus, weekly work assignments, when specified, are performed in terms of averages. For a one half-time appointment, the graduate assistant's normal work time should not exceed 10 hours per week. For a full-time appointment, the average number of hours should not exceed 20 hours per week. The graduate assistant and the immediate supervisor should mutually understand the normal number of hours for conducting an assignment. For percentage efforts not covered by those appointments, the normal work time per week will be prorated.

Research assistants whose research is applicable to their thesis or dissertation requirement should not expect to be compensated for work beyond 20 hours. (Hours should be prorated if appointment is for less than full-time.)

Course Loads for Graduate Assistants

A full-time graduate assistant in each of the four categories of assistantships normally should enroll for 6-12 semester hours of coursework until the minimum course requirements are complete. A one-half-time graduate assistant in each of the four categories of assistantships normally should take 9-14 semester hours. A student on a full assistantship who takes at least six semester hours will be considered a full-time student. During the summer term, a student on an

assistantship who takes at least three semester hours will be considered a full-time student. A student's academic home unit is responsible for implementing these policies, regardless of the assignment or responsible account. It is, therefore, essential that the home unit be notified by any other unit employing the student of any assistantship awarded at the time of its initiation or renewal.

As stated in the *TTU Administration of Graduate Assistantships Handbook*, FICA and Medicare tax is not applied to graduate assistant wages. According to INS regulations, additional employment is not permitted for international students who are employed as graduate assistants working 20 hours per week.

Students employed as graduate assistants are assumed to be full-time employees. Graduate assistants should inquire with the departmental chair to become cognizant of current TTU regulations prior to considering additional employment.

Evaluation/Supervision of Graduate Assistants

Supervisors of graduate assistants will conduct a periodic evaluation of each assistant. The results of the evaluation will be made available to the assistant. A copy will be placed in the student's academic file and the file of the unit employing the student. Appropriate follow-up also should occur. The immediate supervisor for each graduate assistant should be identified when possible on the Personnel Action Form prior to the beginning of the assistantship. The chain of responsibility within each unit should be clearly indicated to graduate assistants. Thus, each graduate assistant should know that the immediate supervisor is the person to whom first contact is to be made in job related questions/directions. Subsequent contact would be made with the unit chairperson or director, dean of the college, and the Associate Vice President for Research and Graduate Studies.

Orientation/Training of Graduate Assistants

There should be a thorough, systematic plan of orientation and training of all graduate teaching assistants and graduate teaching associates. Such orientation and training may be done at the department, college, or university level. It is the responsibility of each supervisor to see that his/her graduate assistant is provided appropriate orientation/training. Graduate assistants who work in laboratories and administrative offices may receive initial orientation, followed by work experiences that constitute training. In such instances, the training period should be clearly communicated to the student assistant.

In addition to the above, TTU has a strict policy on preventing Sexual Harassment that graduate assistants should be made cognizant of. TTU does not tolerate sexual or racial harassment in the academic, residential, or work environment. Hence measures to periodically educate and train employees regarding conduct that could constitute a violation of this policy. Graduate assistants

may periodically fall under these measures. They are expected to participate in such education and training and to be knowledgeable of policies and guidelines concerning harassment.

Supervisors of graduate assistants are also responsible for taking reasonable and necessary action to prevent and discourage sexual or racial harassment and are required to promptly report conduct that could be in violation of Tennessee Board of Regents (TBR) and institutional policies and guidelines. Such reporting should occur when information concerning a complaint is received formally or informally. For more details on the sexual harassment training that graduate assistants must take, the student should check <https://www.tntech.edu/titleix/>.

Accepting/Declining an Assistantship

Tennessee Technological University adheres to the following for those assistantships that are for an entire year:

Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants

Acceptance of an offer of financial support (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by a prospective or enrolled graduate student completes an agreement that both student and graduate school expect to honor. In that context, the conditions affecting such offers and their acceptance must be defined carefully and understood by all parties. Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this Resolution. In those instances in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment has been made. Similarly, an offer by an institution after April 15 is conditional on presentation by the student of the written release from any previously accepted offer. The institution further agrees it and organizations subscribing to the above Resolution that a copy of this Resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer National Council of Graduate Schools.

POLICY ON PLAGIARISM

POLICY ON PLAGIARISM

Plagiarism is stealing another person's thoughts, ideas, or words. Evidence of plagiarism in assignments (or cheating on quizzes/tests) may result in a failing grade for the assignment; evidence of plagiarism on the final exam may result in an "F" for the semester. TTU follows a strict policy on avoiding plagiarism that all graduate students are expected 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/>

Students are also encouraged to contact the graduate school when beginning their thesis or dissertation for help on avoiding plagiarism in their writing. The graduate school has several other resources available that can assist students in this regard.

GRADUATE SEMINARS

GRADUATE SEMINAR (CEE6910)

The CEE department supports a professional development seminar series for graduate students. These seminars (provided as part of a 1 hour course- CEE6910 CEE Graduate Seminar) offer an opportunity to hear distinguished speakers, to acquire new knowledge, and to stimulate one's thinking as part of the graduate experience. Incoming (new) graduate students also receive orientation on the graduate program. All graduate students are required to attend the departmental seminars as part of their plan of study (M.S students – 1hour minimum; PhD – 2 hours minimum).

The graduate seminar program is organized by TTU's Civil and Environmental Engineering Department every Fall semester. In addition, the graduate seminar program is also a forum for graduate students to present their research in preparation of their final thesis defense. Beyond minimum requirements, it is expected that all graduate assistants and their advisors shall make an effort to attend on a regular basis. Graduate research assistants are also be encouraged to deliver at least one seminar to this forum before their graduation.

For external speakers of the seminar, the department may schedule a session for an informal meeting with the speaker and graduate students/faculty.

GRADUATE CURRICULUM

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CEE Sub-Discipline	Course Number	Course Title
Water Resources and Environmental Engineering	CEE 6610	Applied Environmental Chemistry
	CEE 6520	Open Channel Hydraulics
	Statistics Course	Graduate level statistics course selected in consultation with advisor
Structural Engineering	CEE 6930	Theory of Elasticity
	CEE 7610	Finite Element Analysis I
Transportation Engineering	CEE 6410	Traffic Control Systems
	CEE 6470	Transportation Demand Analysis
	Statistics Course	CEE 6200 – Statistical Inference for Engineers OR MATH 6170 – Experimental Design I OR other graduate level Statistics course selected in consultation with advisor
Construction Materials	CEE 6300	Multi-Scale Analysis of Concrete
	CEE 5190	Advanced Mechanics of Materials
	Statistics Course	CEE 6200 – Statistical Inference for Engineers OR MATH 6170 – Experimental Design I OR other graduate level Statistics course selected in consultation with advisor
Structural Mechanics	CEE 6930	Theory of Elasticity
	CEE 7610	Finite Element Analysis I
	MATH 5510	Advanced Math for Engineers
Geotechnical Engineering	CEE 6800	Advanced Soil Mechanics (application for Graduate Catalog in progress)
	CEE 6810	Seepage and Slope Stability (application for Graduate Catalog in progress)
	Mechanics or Hydraulics Course	CEE 6350 – Finite Element Analysis – geo/structural students OR CEE 6520 – Open Channel Hydraulics – geo/environmental students

TIPS ON PREPARING THE RESEARCH PROPOSAL

TIPS ON PREPARING THE RESEARCH PROPOSAL

(Compilation Source: <http://soa.utexas.edu/students/ms-proposal> - University of Texas).

Tips on MS Research Proposal

A Master of Science thesis is a demonstration of the student's ability to conduct effective research using largely secondary sources and, where appropriate, primary sources. The end product is a cohesive, well-written, and illustrated defense of your thesis statement.

After considering the intellectual interests using the guidelines below, it is recommended that the student discuss his/her proposed project with the thesis advisor. This will open a critical dialogue, very likely over several meetings with him or her, in the process of which the student can bring the written proposal to the level of development appropriate for the consideration of graduate committee.

It is recommended that the student make an attempt to adopt the following guidelines while preparing the research proposal:

1. **Thesis Statement.** Provide a concise and specific statement of the question you propose to tackle and perhaps answer. Describe in outline the argument to be made.
2. **Previous Research on the Topic.** Give a summary of the contents of the literature relevant to the subject and the research on the topic.
3. **Methodology.** Describe how you will pursue research, including the critical and theoretical basis of the investigation. This section conveys how you will develop your argument.
4. **Anticipated Findings.** Keeping in mind that research is empirical and interactive, discuss what you hope your work will establish in confirming the statement of your thesis. If possible, indicate what findings would disconfirm your thesis.
5. **Bibliography.** List sources of research, both secondary and primary. The bibliography should conform to the standard format as outlined in the graduate thesis preparation guideline.
6. **Schedule.** Include the start date and key deadlines for the sub-objectives of your thesis project. (Depending on the anticipated length of your research, the schedule should be broken down into monthly objectives, or, preferably bi-monthly dates.)

Tips on Ph.D. Research Proposal

A doctoral dissertation is a demonstration of the ability to conduct effective research using largely primary sources. The dissertation also demonstrates command of secondary sources and other relevant research materials. The end product is a cohesive, well-written, and illustrated document that contextualizes, explicates, and defends the student's dissertation's thesis.

It is recommended that the Ph.D. Dissertation Proposal consists of the following:

1. **Dissertation Working Title and Statement.** Provide a concise and specific statement of the question you propose to tackle. Describe the argument you intend to make, and why the subject is significant to the field of architectural history, and perhaps beyond.
2. **Previous Research on the Topic.** Give a summary of the literature relevant to the subject and your research on the topic. Note any special language skills necessary for your work and how you will satisfy these requirements.
3. **Methodology.** Describe how you will pursue your research, including the critical and theoretical basis of your investigation. This section conveys how you will develop your argument. Does your dissertation require travel for first hand research? Indicate how this will be accomplished.
4. **Anticipated Findings.** Keeping in mind that research is empirical and interactive, discuss what you hope your work will establish in confirming your dissertation's thesis. Indicate also what findings would disconfirm your thesis.
5. **Bibliography.** List sources of research information, both primary and secondary, with particular attention to archives and archival materials to be consulted. The bibliography should conform to the standard format as outlined in thesis preparation guideline.
6. **Schedule.** Include the start date, key deadlines of sub-objectives, and the anticipated completion date of your dissertation. Note again any travel required for your research. Depending on the anticipated length of your project, the schedule should be broken down into quarterly or monthly objectives.

PREPARING FOR Ph.D. DISSERTATION DEFENSE

PREPARING FOR PH.D. DISSERTATION DEFENCE

A Ph.D. dissertation defense represents 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 defence itself to convince the committee members and the general audience that the work he/she has completed justifies the award of the Ph.D. degree.

At a minimum, it is recommended that the student follows the following guidelines while preparing for the defense:

1. Publicize your defense date at least 2 weeks before the scheduled date.
2. During your presentation, emphasize how your research has contributed to the body of knowledge in the relevant field.
3. Make your presentation under 60 minutes
4. Practice dry-runs with your major advisor, conference meetings, graduate seminars and yourself.
5. Continually critique the presentation and keep revising until you are comfortable with what you are presenting.
6. Seek advice of your major advisor and committee members more frequently as near the completion of your thesis.

TIPS ON WRITING AN EFFECTIVE THESIS/DISSERTATION

TIPS ON WRITING AN EFFECTIVE THESIS/DISSERTATION

The Ph.D. dissertation is the ultimate educational product. It reflects the training the Ph.D. student received in technical, analytical and writing skills. CEE Department encourages students to strive for the highest standards in dissertation writing. Outstanding dissertations are those where students are very creative and intellectually adventurous, and where a love and passion for their work is clearly evident through the display of intense curiosity and drive in their work. In essence, the student should emphasize through the dissertation how his/her work has contributed to the existing body of knowledge in the relevant field.

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

1. Is it well written and organized?
2. Connects all components and chapters in a seamless way (like reading a novel)?
3. Exhibits mature and independent thinking?
4. Has a point of view, and a strong, confident independent authoritative voice?
5. Asks new questions or addresses an important problem?
6. Is thoroughly researched?
7. Has rich data from multiple sources?
8. Is publishable in top-tier journals?
9. Conclusions tie the whole thing together?
10. Pushes the discipline's boundaries and opens 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 the above as much as possible with active support from his/her major advisor.

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

Component 1: Introduction

The introduction should include:

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

Component 2: Literature Review

- i) Should be comprehensive and upto 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 source: <http://www.cs.columbia.edu/~hgs/etc/writing-style.html>; University of Columbia).

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;
- Identify the significance of the results: what improvements and impact do they suggest.

A typical outline of a paper can be as follows:

- **Abstract**, typically not more than 100-150 words;
- **Introduction** (brief): introduce problem, outline solution; the statement of the problem should include a clear statement why the problem is important (or interesting);
- **Related Work** (or before summary). Hint: In the case of a conference, make sure to cite the work of the PC co-chairs and as many other PC members as are remotely plausible, as well as from anything relevant from the previous two proceedings. In the case of a journal or magazine, cite anything relevant from last 2-3 years or so volumes;
- **Outline of the rest of the paper**: "The remainder of the paper is organized as follows. In Section 2, we introduce...Section 3 describes ... Finally, we describe future work in Section 5." [Note that Section is capitalized. Also, vary your expression between "section" being the subject of the sentence, as in "Section 2 discusses ..." and "In Section, we discuss ..."]
- **Body of paper**
 - Problem
 - Approach/methodology
 - Results

The body should contain sufficient motivation preferably with illustrating figures, followed by a crisp problem statement. The paper may or may not include formalisms.

- **Related work**, if not done at the beginning
- **Summary and Future Work**
 - Often repeats the main result
- **Acknowledgements**
- **Bibliography**
- **Appendix** (to be cut first if forced to):
 - Detailed protocol descriptions
 - Proofs with more than two lines
 - Other low-level but important details

TIPS ON MAKING AN EFFECTIVE PRESENTATION

TIPS ON MAKING AN EFFECTIVE PRESENTATION

(Compilation source: <http://landau.rice.edu/~aac/phys519/tips.html>; Rice University).

An effective presentation can have a good impression on the committee members and the general audience after the M.S. or Ph.D. dissertation defense. It is therefore very important that the student allocate significant time and effort towards making an effective presentation of his/her research work.

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 talk should be clearly and logically organized.
3. **Differentiate between main points and secondary issues.** For longer talks a summary or a review of the key points at the end of the talk can be very effective.
4. **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 talk, 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! For most speakers something in between these two extremes is appropriate; use whatever best suits your style of presentation.
5. **Practice your presentation, preferably in front of friends or family and ask for feedback.** Check the timing of your talk! Does it fit comfortably within the time allotted? Running out of time is a common problem, and can ruin an otherwise good talk.
6. **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 helps to reduce anxiety.
7. **Speak clearly** and with sufficient volume to be heard throughout the room (this applies even if you are using a microphone).

8. **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.
9. **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 talks 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.
10. **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.
11. **Cookeville has a local chapter for Toastmasters International** – the club for public speaking. Students interested in honing their public speaking abilities are recommended to join this club.

APPENDIX 1

USEFUL INFORMATION FOR DOCTORAL COMMITTEE CHAIRPERSONS

(Source: Official documentation is still pending in the University's graduate studies website)

1. **Preliminary Assessment**

During the first semester or early in the second semester of enrollment, the Ph.D. student must undergo an assessment of his/her strengths and weaknesses in the academic area of study and field of research. The purpose of this assessment is to tailor a Program of Study of advanced coursework and to prepare the student to undertake independent research. Each department will have its own policy on the instruments of this assessment procedure and its administration. The chairperson of the department and the chairperson of the advisory committee are expected to work together in advising the student in this first step which must be completed before the end of the second semester.

2. **Formation of the Advisory Committee**

The policy of the graduate school requires that the student, in consultation with the department chairperson, will determine a minimum of five qualified and suitable graduate faculty members who are willing to serve on the advisory committee. The chairperson of this committee will assist the student and the chairperson of the department in this task.

Under normal circumstances, a single faculty member will act as chair of the advisory committee. The expertise of the faculty member in the subject area will be the primary criterion guiding the chair selection. In the case of some interdisciplinary research projects, two faculty members may be appointed as co-chairs on the advice of the Department Chair and at the discretion of the Associate Dean of Engineering for Graduate Studies. The expertise of the two faculty members contributing more or less evenly in guiding the interdisciplinary research will be the primary criterion for the selection and appointment of joint chairs.

If for any reason, the chair of an advisory committee is unable to continue in that capacity (e.g., change of employment, retirement, poor health, sabbatical leave, etc.) and if the student is already near completion of the research work, then a second faculty member with strong expertise in the subject area may be appointed as co-chair. However if the student has not made significant progress in the research work, a new chair of the committee may be appointed to advise the student in the same area of research or in a new area as determined appropriate under the circumstances.

The committee will consist of a minimum of three members from the student's major department and at least one member from outside the department.

The Associate Dean of Engineering for Graduate Studies will serve as an ex-officio, non-voting member of the committee. An individual highly qualified in the proposed area of research, but outside of Tennessee Tech, may also be invited to serve on the committee as a non-voting member with the approval of the Associate Dean of Engineering for Graduate Studies and the Associate Vice President for Graduate Studies. The student must initiate any changes in the composition of the committee with a written request following the procedure mentioned in the catalog.

3. **Meetings of the Advisory Committee**

The advisory committee will normally meet several times during the student's tenure to review the progress made and to counsel the student. At minimum, the committee shall meet for the following actions at the appropriate times:

1. To decide on the Program of Study
2. To decide on the administration of the comprehensive examination
3. To evaluate the student's performance in the comprehensive examination including the approval of the research proposal
4. 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. It is expected that a minimum, of four meetings of the committee will be convened during the period of the student's study. 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 Graduate Studies.

4. **Program of Study**

The student's Program of Study should be filed by the time he/she completes 15 course credits towards doctoral studies. A minimum of 24 credits of course work (including at least 12 credits at 7000 level) beyond the masters and 24 credits of doctoral research and dissertation are required. The program of study will also include the graduate level background courses taken prior to enrollment in the doctoral program (e.g., 24 hours of course credit at the masters level). The advisory committee is responsible for developing the appropriate program of study taking into account the results of the preliminary assessment of the student's strengths and weaknesses in the academic area of study and the intended field of research.

5. **Comprehensive Examination**

The Ph.D. comprehensive examination will consist of a written part and the presentation and oral defense of the research proposal. The chair of the committee will work with the other committee members and the student to

schedule the written parts and the proposal presentation part in due time. See the college policy on administering comprehensive examination and evaluating the student performance. The written comprehensive examination and a copy of approved version of the proposal should be sent to the department office for safe-keeping.

6. **Duration of Ph. D. Studies**

All requirements for the Ph.D. degree, including dissertation, should be completed within a period of eight consecutive years. A student receiving financial assistance is expected to pass the comprehensive examination and become a candidate for the degree within a continuous period of three years to qualify for the assistantship beyond that time. Normally a student is expected to complete the proposed research and defend it in about a year after becoming a candidate for the degree.