CS Graduate Student Handbook

Revision notes

- What is new of Fall 2023 from Spring 2023 version
 - The revision of the CPT section (with new title CPT/CS5000 and other details).
 - The wording "Comprehensive Exam" is removed from the document. We will use comprehensive evaluation from now on. The essay and task options for comprehensive evaluation are no longer available. Now industry career certificates can be used to fulfill comprehensive evaluation requirements.
 - Non-CS course section is added (Section 12): pre-approved list is added.
- What is new for the Spring 2023 version from Fall 2022?
 - Fall 2022 version was not officially released
 - The comprehensive exam is revised. Students has to choose a faculty to conduct their comprehensive exam.
 - CPT procedure is added.
- What is new for the Fall 2022 version from the Fall 2021 version?
 - Added version name in the header in the form of *semester year*.
 - Test based comprehensive exam is replaced by essay based exam.
 - Section of course transfer is added.
 - Comprehensive exam revised with essay option.
 - Forms on publications for PhD students to submit about their PhD candidacy and PhD graduation.
 - CS5120 credit change?
 - Master students with thesis options and PhD students need to file their publications annually following the graduate school rule. The department requires that for every publication, the link(s) to the index (or indices) which contains this paper should be included in the students' report.

General notes

- Master of Science in Computer Science (MSCS): 31 credits for thesis degree students, 37 credits for non-thesis degree students
- Master of Science in Software and Security Engineering (MSSSE): 31 credits for thesis degree students, 37 credits for non-thesis degree students
- Doctor of Philosophy (PhD) in Computer Science: 72 credits
- Certificate in Software Engineering: 12 credits
- Certificate in Security: 12 credits

Important sources

- If you write to our graduate advisor(s), you must use the official email address <u>cs.grad advisor@ttu.edu</u>
- The forms and lists (e.g., pre-approval non-cs course list) of useful information is here.
- <u>Graduate catalog (2023 version.</u> You can go to the graduate catalog home page to find the latest version) covers almost all issues you may come across during your graduate study.

1. Introduction

The goal of this document is to compile and formalize the policies and procedures of the graduate program of the Computer Science Department at Texas Tech University. This document complements the rules of the Graduate School, all of which must be met to obtain the graduate degree. In general, CS graduate students need to meet credit hours, core and elective courses, GPA, seminar, and thesis/non-thesis requirements to graduate. Additionally,

doctoral students need to meet a qualifying exam, defense exam, and publication requirements to graduate.

1.1 Procedure for students to seek help

To help students to obtain the most timely answer and to best use our resources, we design the following steps. A student who needs help should follow the steps below in order:

- Check out the graduate catalog and computer science graduate handbook (available on Piazza).
- Check answers and ask questions first on Piazza forum.
- If your questions cannot be answered by the Piazza forum, write to the official advisor email.
- Walk-in visits of graduate advisors should be only when your questions cannot be solved by the steps above.

2. Doctor of Philosophy Program

2.1. Coursework and Basic Requirements

- 1) All Ph.D. students are required to take 20 CS courses (60 hours). To take any non-CS courses, refer to the "Non-CS Course Requirement" section of this document.
- 2) Of the 20 courses, 6 of them, i.e., 18 hours, may be CS 7000 (for students who enrolled after Fall 2019; 4 CS 7000s for students who enrolled before Fall 2019).
- 3) All Ph.D. students must attend at least 8 CS seminars annually. (Note: for Ph.D. students enrolled after August 2020. Ph.D. students who enrolled before August 2020 can take 1 hour graduate seminar course following Section 8)
- 4) Ph.D. students need to have a minimum of 12 hours of 8000, and at least 3 hours of 8000 during the graduating semester.
- 5) Ph.D. students are required to have a minimum of 72 hours by the time of dissertation defense.

Below is a typical break-up of credit hours towards the degree plan.

CS 7000: 18 hours (for students who enrolled after Fall 2019; 12 hours before) Other CS courses: 42 hours

Seminar courses: 1 hour (Note: this course is not required for Ph.D. students enrolled after August 2020. Instead, Ph.D. students enrolled after August 2020 are required to attend 8 CS Seminars annually.)

Dissertation: >=12 hours

6) Ph.D. candidacy (i.e., Ph.D. qualifying exam): Ph.D. students are required to have a minimum of 2 accepted publications indexed by Web of Science, ACM digital library, and Scopus within the first 2 years. The student should be the first author of at least one publication.

Contingency plan: students may extend one more year. After three years, the corresponding advisor needs to provide reasons to the graduate committee if a Ph.D. student still fails the qualifying exam.

To obtain the status of PhD candidacy, it is the responsibility of a student to submit the document, in a timely manner, to the graduate advisor. The document containing the following components, for each paper, include

- the full citation (i.e., the details) of the paper (in the format you use for each paper in the references section of your accepted/published paper), AND
- the link(s) to the index (or indices) which contains this paper.
- 7) As of Fall 2018, students are required to have a minimum of 4 accepted publications before they can graduate. Acceptable indexes are Web of Science, ACM digital library, and Scopus. The student should be the first author of at least two publications with the Chair(s) of the dissertation committee (i.e., the dissertation advisor).

To graduate, it is the responsibility of a student to submit the document whose format is given in item 6) above, in a timely manner, to the graduate advisor.

All students are required to complete the publication data sheet by July 31st each year before they will be allowed to register for courses. The data sheet is in Section 9 of this handbook.

2.2. Selection of Dissertation Committee

- 1) Students must select their dissertation committee in consultation with their dissertation advisor.
- 2) The dissertation committee should consist of the following: five committee members, including committee chair (dissertation advisor), three faculty members from Computer Science, and the fifth is the Dean's representative.
- 3) Occasionally, a dissertation may require an additional external committee member. This committee member must hold a Ph.D. and should be approved by both the dissertation advisor and Graduate school.

2.3. Admission to Candidacy

After the Qualifying Examination is passed, the Graduate Dean recommends the student for Admission to Candidacy to the Graduate Council. Admission to Candidacy must occur at least 4 months prior to the student's graduation date.

2.4. Dissertation Proposal

The Dissertation Proposal is a PhD Candidate's written and/or oral presentation about the preliminary dissertation to the Dissertation Committee and the Graduate Dean's representative. The Dissertation Proposal is optional but strongly recommended.

2.5. Dissertation Defense

The Dissertation Defense is a public oral examination over the field of the dissertation given by the Dissertation Committee and the Graduate Dean or his/her representative. At least 4 months must intervene between the Qualifying Examination and the Dissertation Defense. The procedure consists of the following.

- 1) A student planning to graduate must file a "Statement of Intent to Graduate" at the beginning of the semester of intended graduation (via RaiderLink). A list of deadlines, including the date for filing can be found on the Graduate School website (www.gradschool.ttu.edu).
- 2) After Step 1, the student should consult with all committee members to identify appropriate time for the defense.

- 3) In consultation with the dissertation advisor, the student is responsible to identify the Graduate Dean's Representative to attend the defense exam.
- 4) The Graduate School must be notified of the time of the final oral examination at least three weeks in advance. To do this, the student must submit a doctoral Exam/Defense Notification Form¹ to the department graduate advisor at least three weeks in advance.
- 5) Notice of the dissertation defense (abstract, time, place, committee, and publication references) should be emailed to all graduate students and faculty in the department as well as the college. An email including all information above must be sent to the graduate advisor, who will then be sent on behalf of the student.
- 6) The dissertation defense will consist of 3 parts: oral presentation by the candidate, open question session and "closed" question session where only the thesis committee members are present.

2.6. Time Limit and additional information

All requirements must be completed within a period of 8 calendar years or 4 years from Admission to Candidacy, whichever comes first. See additional information including Residency and Course Transfer in the catalog.

3. Master of Science in Computer Science (MSCS)

Students pursuing the MS (thesis) degree require a total of 31 credits to graduate while students pursuing the MS (non-thesis) degree require a total of 37 credits to graduate. The credit hour breakup of these degree plans is as specified below. The Graduate School requires students to maintain a minimum of cumulative 3.0 GPA every semester. To take any non-CS courses, refer to the "Non-CS Course Requirement" section of this document.

3.1. Coursework and Basic Requirements

- 1) All students pursuing an MSCS degree are required to take the following 4 of the 6 core courses divided into two categories (15 credits):
 - Two of the theory courses: CS 5381 Analysis of Algorithms; CS 5383 Theory of Automata; CS 5384 Logic for Computer Scientists
 - Two of the system courses: CS 5352 Advanced Operating Systems Design; CS 5375 Computer Systems Organization & Architecture; CS 5368 Intelligent Systems
- 2) The students need to maintain a cumulative GPA of a minimum of 3.0 every semester.
- 3) The 31-credit degree plan for MS Thesis:
 - Core courses: 12 hours Course electives: 12 hours (3 hours may be 7000) Seminar courses: 1 hour (CS5120 see section 8) Thesis Research: 6 hours
- 4) The 37-credit degree plan for MS non-Thesis:

Core courses: 12 hours

Course electives: 21 hours (3 hours may be 7000) or

¹ See https://www.depts.ttu.edu/gradschool/academic/TD_CompletionRequirements.php

24 hours (comprehensive exam option) Seminar courses: 1 hour (see section 8) Project/report: 3 hours (does not apply to comprehensive exam option) The project will be solely evaluated by the project advisor.

3.2. Advisor assignment

The students pursuing MS degrees need to contact faculty members whose area of research they are interested in within the first two semesters.

3.3. MS Thesis Committee Selection

- 1) The thesis committee should consist of the following: three committee members, including committee chair (thesis advisor) and at least one more faculty member of Computer Science.
- 2) Occasionally, a thesis project might require an additional external member. This additional committee member must hold a Ph.D. degree and should be approved by the thesis advisor.

3.4. Thesis Defense

- 1) A student planning to graduate must file in the Graduate School's office a "Statement of Intent to Graduate" at the beginning of the semester of intended graduation (via RaiderLink). A list of deadlines, including the date for filing the "Statement of Intent to Graduate," can be found on the Graduate School website (www.gradschool.ttu.edu).
- 2) After Step 1, the thesis student should contact the Thesis committee members to identify a time slot suitable for everyone.
- 3) The Graduate School must be notified of the time of the final oral examination at least three weeks in advance.
- 4) Notice of the thesis defense (abstract, time and place) should be emailed to the graduate advisor who will then send it to all graduate students and faculty in the department.
- 5) The thesis defense will consist of 3 parts: oral presentation by the candidate, open question session and "closed" question session where only the thesis committee members are present.

3.5. MS Project Completion Requirement

- 1) A student planning to graduate must file in the Graduate School's office a "Statement of Intent to Graduate" at the beginning of the semester of intended graduation (via RaiderLink). A list of deadlines, including the date for filing the "Statement of Intent to Graduate," can be found on the Graduate School website (www.gradschool.ttu.edu).
- 2) The MS project will be evaluated solely by the project advisor.

4. Master of Science in Software and Security Engineering (MS3E)

The Master of Science in Software and Security Engineering (MSSSE or MS3E) is a degree program with an emphasis on advanced software engineering and security concepts including

computer and information security, and practices in secure software and system production. This degree program requires filing a degree plan within the student's first semester of study and passing the Final Comprehensive Examination as required by the university.

The degree plan for students pursuing a MS3E has three options: a thesis option and two project options. Students pursuing the thesis option require a total of 31 credits to graduate while students pursuing the project (or non-thesis) options require a total of 37 credits to graduate. The credit hour breakup of these degree plans is as specified below. The Graduate School requires students to maintain a minimum of cumulative 3.0 GPA every semester. To take any non-CS courses, refer to the "Non-CS Course Requirement" section of this document.

4.1. Coursework and Basic Requirements

1) All students pursuing an MS3E degree are required to take the following 2 core courses (6 credits):

CS 5373 – Software Modeling and Architecture

- CS 5340 Introduction to Information and Computer Security
- 2) Students need to maintain a cumulative GPA of a minimum of 3.0 every semester.
- 3) The 31-credit degree plan for MS3E Thesis: Core courses: 6 hours
 Electives: 18 hours from the following Elective Courses, including 9 hours of Software Engineering Electives (3 hours can be replaced with one 3-hour Non-SE/Security elective course) and 9 hours of Security Electives. Seminar course: 1 hour (CS 5120 Computer Science Seminar, see section 7) Thesis Research (CS 6000): 6 hours
- 4) The 37-credit degree plan for MS3E project (or non-thesis) option: Core courses: 6 hours

Electives: 21 hours from the following Elective Courses, including 12 hours of Software Engineering Electives (6 hours can be replaced with two 3-hour Non-SE/Security elective course; CS 7000 must not be taken more than 3 hours) and 9 hours of Security Electives.

Seminar course: 1 hour (CS 5120 Computer Science Seminar, see section 8) Project (CS 6001): 3 hours

The project will be evaluated solely by the project advisor.

5) Elective Courses:

Software Engineering (SE) Electives:

CS 5332 – Special Topics in Software Engineering

CS 5363 - Software Project Management

CS 5374 – Software Verification and Validation

Security Electives:

CS 5342 – Network Security

CS 6343 – Cryptography

CS 6378 – Software Security

CS 6345 – Digital Forensics

CS 6359 – Data Security and Privacy

CS 5333 – Special Topics in Security

Non-SE/Security Electives:

- CS 5331 Special Problems in Computer Science
- CS 5356 Advanced Database Management Systems
- CS 5364 Information Retrieval
- CS 5377 Distributed Computing
- CS 5379 Parallel Processing
- CS 7000 Research
- IE 5316 Simulation Models for Operations Analysis
- IE 5319 Risk Modeling and Assessment
- IE 5320 Systems Theory

4.2. Advisor assignment

Students pursuing MS3E degrees need to contact faculty members whose area of research they are interested in.

4.3. MS3E Thesis Committee Selection

- 1) The thesis committee should consist of the following: three committee members, including committee chair (thesis advisor) and at least one more faculty member of Computer Science.
- 2) Occasionally, a thesis committee might require an additional external member. This additional committee member must hold a Ph.D. degree and should be approved by the thesis advisor.

4.4. Thesis Defense

- A student planning to graduate must file in the Graduate School's office a "Statement of Intent to Graduate" at the beginning of the semester of intended graduation (via RaiderLink). A list of deadlines, including the date for filing the "Statement of Intent to Graduate," can be found on the Graduate School website (www.gradschool.ttu.edu).
- 2) After Step 1, the thesis student should contact the Thesis committee members to identify a time slot suitable for everyone.
- 3) The Graduate School must be notified of the time of the final oral examination at least three weeks in advance.
- 4) Notice of the thesis defense (abstract, time and place) should be emailed to the graduate advisor who will then send it to all graduate students and faculty in the department.
- 5) The thesis defense will consist of 3 parts: oral presentation by the candidate, open question session and "closed" question session where only the thesis committee members are present.

4.5. MS³E Project Completion Requirement

1) A student planning to graduate must file in the Graduate School's office a "Statement of Intent to Graduate" at the beginning of the semester of intended graduation (via RaiderLink). A list of deadlines, including the date for filing the "Statement of Intent to Graduate," can be found on the Graduate School website (www.gradschool.ttu.edu).

2) The project will be evaluated solely by the project advisor.

5. Certificate in Software Engineering

The Graduate Certificate in Software Engineering is intended for those who do not need or wish to have a full graduate degree in software engineering or computer science. In particular, the certificate is directed towards working professionals and graduate students who are interested in systematic software development. In addition to any leveling requirements, coursework for the certificate requires 12 hours. Courses Required:

CS 5373 – Software Modeling and Architecture

Plus, three courses from:

CS 5332 – Special Topics in Software Engineering

CS 5363 – Software Project Management

CS 5374 – Software Verification and Validation

One of three courses may be replaced with one course in the following:

CS 5379 – Parallel Processing

CS 5356 – Advanced Database Management Systems

CS 5377 – Distributed Computing

CS 5364 – Information Retrieval

IE 5316 – Simulation Models for Operations Analysis

IE 5319 – Risk Modeling and Assessment

IE 5320 – Systems Theory

6. Certificate in Security

The Graduate Certificate in Security is intended for those who do not need or wish to have a full graduate degree in security or computer science. In particular, the certificate is directed towards working professionals and graduate students who are interested in security. In addition to any leveling requirements, coursework for the certificate requires 12 hours. Course Required:

CS 5340 – Introduction to Information and Computer Security Plus, three courses from:

CS 5342 – Network Security

CS 6343 – Cryptography

CS 6378 – Software Security

CS 6345 – Digital Forensics

CS 6359 – Data Security and Privacy

CS 5333 – Special Topics in Security

One of three courses may be replaced with one course in the following:

CS 5331 – Special Problems in Computer Science

CS 5379 – Parallel Processing

CS 5356 – Advanced Database Management Systems

CS 5377 – Distributed Computing

CS 5364 – Information Retrieval

IE 5316 – Simulation Models for Operations Analysis

IE 5319 - Risk Modeling and Assessment

IE 5320 – Systems Theory

7. Comprehensive Evaluation Policy

The following comprehensive evaluation procedure will be effective starting Fall 2023.

Everyone needs a comprehensive evaluation. It can be fulfilled by

- An industry career certificate from a department approved list. The certificate has to be obtained AFTER two long semesters at TTU.
- Internship/CPT
- Master Report / Project
- Master Thesis

The department approved list consists of all certificates offered through the TTU INDUSTRY CAREER CERTIFICATES program <u>here</u>.

Students Responsibilities and Important Dates:

- Submit your certificate to <u>this form</u>. You have to submit before the final exam week of your graduating semester. Your certificate should be a link (and maybe passwd) from your certificate issuer.
- You may take a certificate outside of the department approved list, but it has to be well recognized by the industry and the issuer can provide direct link/means for authentic certificate. If you plan to take such a certificate, fill in <u>this form</u> (even during your first year of study) on what certificate you plan to choose, give a link to the program and a justification. The department will make the final decision on whether the proposed certificate is acceptable. There are two opening windows for this request every year: the first two weeks of January or the last two weeks of August.

Note

- This comprehensive exam does not contribute to credits required for graduation.
- This option is available only to the students who will complete 36 credits of lecture courses.

8. Policy regarding the Graduate Seminar (CS 5120):

All master students (MSCS and MSSE) must attend 10 seminars with corresponding summaries within the first year of their enrollment in their respective program. The students must achieve attendance at 10 seminars by attending 5 seminars in their first semester and then 5 seminars in the second semester. The students will take the below attendance sheet to all seminars and collect signatures from the speakers, or if it is a virtual seminar, we will need to have an attendance report/record as a proof of attendance. Once all 10 have been attended, the sheet will be turned into the graduate advisor.

Distance students of MSSE must view 2 seminars within their first year of enrollment. After 2 have been viewed, an email will be sent to the graduate advisor with the 2 seminars viewed and a summary of each.

Exceptions will be made at the sole discretion of the Graduate Program Coordinator and/or the Chair of Computer Science.

The absolute last date we need to give you a Pass or Fail grade for the seminar hour CS 5120 is the grading deadline in your graduating semester, but the instructor on record usually requires an earlier date before that, as she/he will need time to process your report and assign you grades. Most students finish sending all reports and get a Pass grade within 2 semesters.

Name		R#		
Seminar	Date	Speaker	Title	Dept

Graduate Seminar 5120

9. Ph.D. Data Sheet

Name

Paper/Poster Published/Accepted Month/Year Index Reference Author, year, title, publication source Paper/Poster Published/Accepted Month/Year Index Reference Author, year, title, publication source

Paper/Poster Published/Accepted Month/Year Index Reference Author, year, title, publication source

10. Course Transfer

A graduate course may be accepted for transfer from another university as long as the following conditions are met:

- A 'B' or above is made in the course by proof of an official transcript submitted to the Graduate School.
- The course is not taken by correspondence.
- The inclusion of the course satisfies degree plan requirements.
- A Texas Tech University course corresponds to the transferred course.
- The course is from a computer science or similar program.

Other rules on course transfer

- For the Certificate in Software Engineering, one may transfer up to one course which must be a Computer Science course.
- For the MSCS/MSSSE program, one may transfer up to 2 courses.
- For our PhD program, one may transfer up to 10 courses with an earned computing master's degree or 4 courses without an earned computing master's degree. Put the equivalent Tech course by the transfer course.
- Students should be prepared to show syllabi and coursework from the courses they wish to transfer.

No courses are transferred until the degree plan (institutional transcripts showing the transfer courses and grades must be attached) is submitted to the Department of Computer Science and approved by the Graduate Advisor. Please refer all other questions regarding transfers to the Graduate Advisor.

Procedure for applying for course transfer.

- Fill the *course transfer application* form by working with your thesis/dissertation advisor called *committee advisor* in the form. You should make this section (Section 9) easily accessible to your advisor.
- The form must be signed by you and your thesis/dissertation advisor.
- Submit the form and the attachment(s) to Graduate Program Coordinator (GPC). Submit the materials in a timely manner if the GPC asks for the syllabus and details of one or more courses.
- If GPC approves the application, they will pass the form to the graduate advisor who will complete the course transfer.

11. CPT / CS5000

The procedure to obtain CPT for all international graduate students:

- The student first notifies the graduate advisor of the intent to take an internship position and asks their employer to send to the official graduate advisor email address the official internship offer letter which must include the following information:
 - o Begin date
 - End date
 - Job Title
 - Job Description
 - Full-time or Part-time
 - On-site or Remote
 - Company name and contact information
- The graduate advisor will provide a permit for the student to enroll 1-hour CS 5000 (this credit hour is not counted toward their degree), and the student needs to enroll 5000. By the end of the semester, the student needs to
 - send to the official advisor email address a report including a list of goals to accomplish in the workplace and the learning experiences, with the subject line: CS5000 report R#.
 - ask your workplace supervisor to send an evaluation of your performance in the workplace to the official advisor email address, with the subject line: CS5000 evaluation R#. Remember to provide your supervisor with our official advisor email, your R# and the subject line to use.
- The student may take an internship across more than one semester. For each semester, the student needs follow the same procedure as outlined in the previous bullet. For example, if a student takes an internship in both Summer' 22 and Fall' 22, they'll need to ask their employer to send in the offer letter before each semester, enroll 1-hour 5000 in Summer and 1-hour 5000 in Fall, and submit a report by the end of each semester.

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- After verifying the enrollment of CS5000 and that the internship meets the requirements (e.g., relevance with computer science) and consulting with the graduate program coordinator when needed, the graduate advisor will issue a signed letter for the student to take to the international office for a work permit.
- If a student takes a full-time internship, they are expected NOT to take any classes. To take any class, they need to send a request and justification to their graduate advisor. After consulting with the graduate program coordinator, the graduate advisor will either approve or deny such requests.

12. Non-CS Course Requirement

Any non-CS courses selected by a student will NOT be counted towards your degree credit hours without departmental approval in advance. For Master students, no more than 2 non-cs courses will be counted towards their degree credits, and for PhD students, no more than 5 noncs courses will be counted towards their degree credits. The department has a pre-approved list of non-cs courses (<u>here</u>). The approval of those courses is automatic, i.e., if you choose a non-cs course from that list, do not write to our graduate advisor (some exceptions will be made clear in the pre-approved list). The chance for the approval of non-cs courses outside the list will be rare. For PhD students to choose non-cs courses, send your research advisor a list of courses to take and ask them to send an approval email to cs.grad_advisor@ttu.edu.