Software Engineering

MS Graduate Handbook
2022 - 2023

ASU Ira A. Fulton Schools of **Engineering**
Arizona State University

MANUAL OF THE MS DEGREE IN
SOFTWARE ENGINEERING

ARIZONA STATE UNIVERSITY

2022 – 2023

Software Engineering graduate degrees please contact:

Office of Graduate Programs
School of Computing and Augmented Intelligence (SCAI)
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Advising Center
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SE on the web: http://SCAI.engineering.asu.edu/forstudent/graduate/software-engineering/
E-mail address: Scai.grad.poly@asu.edu

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I. **Introduction to the Software Engineering Program**

The Master of Science (MS) in Software Engineering Program focuses on developing advanced knowledge and abilities in the design and application of the software. The program involves the application of engineering principles to software development including design methodologies, operation principles, and maintenance and testing approaches. The MS in Software Engineering Program builds upon the BS in Software Engineering Program and is aimed at developing professional skills in this discipline as well as providing opportunities for students to engage in and develop research abilities.

Here at ASU's School of Computing and Augmented Intelligence (SCAI), formerly the School of Computing, Informatics, and Decision Systems Engineering (CIDSE), we envision a society where secure, accurate, and current information is ubiquitously available and data is seamlessly collected, managed, and converted into information that entertains individuals, empowers businesses, and guides the decisions of both in their daily affairs.

We envision our school as a community recognized by its colleagues internationally as a leader in envisioning and enabling the information-driven society and by its students as a preferred location for acquiring the knowledge and skills necessary to contribute to this vision.

We envision a community of scholars cooperatively engaged in transdisciplinary research addressing the grand challenges of modern society and supporting the intellectual growth of students and colleagues.

Our mission is to benefit society through excellence in education, use-inspired research from basic to translational, and leadership in service to the profession and community. We seek to provide a supportive environment that promotes creativity, diversity, multidisciplinary teaming, scholarship, and ethical behavior in order to advance knowledge and practice in computing, information and decision technologies to enhance society.

ASU prohibits all forms of discrimination, harassment and retaliation. To view ASU's policy please see https://www.asu.edu/aad/manuals/acd/acd401.html.

Title IX protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. As required by Title IX, ASU does not discriminate on the basis of sex in the education programs or activities that we operate, including in admission and employment. Inquiries concerning the application of Title IX may be referred to the Title IX Coordinator or to the U.S. Department of Education, Assistant Secretary, or both. Contact titleixcoordinator@asu.edu or 480-965-0696 for more information. Office located at 1120 S. Cady Mall, INTDSB 284. For information on making a report please go to www.asu.edu/reportit/.

The MS in Software Engineering has the following degree program outcomes:

1. **Technical Competence**
   a. Apply and adapt knowledge of software engineering and mathematics appropriate to engineering complex software systems.
   b. Analyze a software engineering problem; identify and define the computing requirements appropriate to its solution.
   c. Effectively develop and deploy advanced software systems to meet the needs of the user environment.
   d. Understand and apply computer science and software engineering best practices and standards.
2. **Design**
   a. Design, evaluate, and adapt software processes and software development tools to meet the needs of an advanced software development project.
   b. Elicit user needs and design an effective software solution.
3. **Communication and Team Skills**
   a. Function effectively on teams, and apply and adapt teaming strategies to influence the productivity of the team in accomplishing a software solution.
   b. Communicate effectively with a range of audiences.
4. **Professionalism and Perspective**
   a. Identify and understand professional, ethical, legal, security, and social issues and responsibilities relevant to engineering software systems.
   b. Understand the local and global impact of software engineering on individuals, organizations, and society.
   c. Recognize the need for and engage in continuing professional development.

II.   Objective of the handbook
The purpose of this handbook is to provide guidance and information related to admission, degree requirements, and general policies and procedures. Please note that in some cases, you will find differences between the Graduate Policies and Procedures and the Software Engineering (SE) Program requirements. In these cases, SE has established higher standards. Students must satisfy both sets of requirements. Note that policies and procedures are occasionally amended to improve the program. Changes will be communicated to students through email and the handbook will be amended accordingly.

III.   Student responsibility and resources
All students are expected to become familiar with university and program policies and procedures and abide by the terms set forth. Information is available both online and by hardcopy upon request. Most importantly, you should visit the following websites:
- The Graduate College – http://graduate.asu.edu.
- Graduate Policies and Procedures: :   https://graduate.asu.edu/policies-procedures visit the section on policies & procedures.
- The Software Engineering Program – http://SCAI.engineering.asu.edu/forstudent/graduate/software-engineering/.

- The International Student Office – https://international.asu.edu/, if applicable.
- The Ira A. Fulton Schools of Engineering – http://engineering.asu.edu.

IV. Wellness Resources

We believe graduate education provides an opportunity to grow in our knowledge and expertise, but during our studies, we may face challenges and hardships that can affect our wellbeing. The Graduate College and the ASU Graduate Student Association have put together resources and best practices guides to help your educational journey. Should you need additional guidance and support, we encourage you to contact a graduate advisor at the SCAI Graduate Advising Office.

- Graduate Wellness Resources – a one-page guide to Financial, Social, Emotional, and Physical Health and Wellness Resources for ASU Graduate Students, developed by the GPSA
- 10 Best Practices in Graduate Student Wellbeing" – proven ways to help graduate students better care for themselves under the increasing demands of graduate school

V. Faculty responsibility

The members of the faculty of Software Engineering have diverse backgrounds and knowledge. Students interested in doing research are encouraged to take the opportunity to make individual appointments with faculty members with whom they have common interests. They are available to assist students who are researching with their plan of study, and with their educational and career goals. Please refer to the list of the faculty names, areas of expertise, and research interest at the end of this handbook.

VI. Admission and eligibility to the MS degree programs

Traditional (non-accelerated) MS in Software Engineering
The Software Engineering MS degree requires a background in engineering, computers, math, sciences or closely related fields. However, in some cases, students with non-traditional educational backgrounds will be considered for admission. These students may be required to take foundational courses to better prepare for the graduate coursework. A student is encouraged to contact a graduate advisor in the School of Computing and Augmented Intelligence to obtain advice on their educational pursuits.

Eligibility - Before applying to the SE MS program, students are required to have completed at least two semesters or 8 credit hours of Calculus (Calc. I & II), and 1 semester or 3 credit hours of Discrete Mathematics. Additionally, applicants will not be admitted if they have more than 2 deficiencies as identified under the "Deficiencies" and "Deficiency Test-Out Exam" sections below.

Application - All students are required to submit an application with ASU's Graduate College and pay the required fee to have their application properly processed.

Application deadlines - **January 15 for Fall and September 15 for Spring**:
To receive full consideration, we ask that you have all the required documents submitted by the deadline.

GRE scores

All students are required to submit official **general** Graduate Record Examination (GRE) scores directly to ASU's Graduate College. The average scores for students admitted into the MS program are available on the SCAI website. We do not require specific subject GRE scores, but they are considered in conjunction with other application materials. The GRE general requirement is waived for a student who either:

- Completed their undergraduate degree program at ASU in Software Engineering, Computer Science, or Computer Engineering with a 3.0 GPA or higher in the last 60 credit hours of course work (Jr/Sr) or
- Completed their undergraduate degree in a STEM related major at ASU with a GPA of 3.75 or higher in their last 60 credit hours of coursework (Jr/Sr).

English Proficiency Requirement - The University requires all international applicants from a country whose native language is not English to provide the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) or the Pearson Test of English (PTE) scores. Or Duolingo English Test. The Software Engineering Program suggested average scores for the TOEFL are 575 (paper-based) or 90 (internet-based) TOEFL, or 7 for IETLS, or 65 for PTE, or 115 for Duolingo for admission. **Please note that your application will not be processed until the university receives the official English Proficiency scores, which are valid two years from the start date of the degree program.** There are some exceptions for students who have been living in the United States and would like to have the English Proficiency requirement waived. Please address all English Proficiency questions to the Office of Graduate Admission. The ASU institution code is 4007. If department code is required, use 99 for TOEFL.

Personal statement - Applicant must submit a personal statement that indicates professional goals and reasons for desiring to enroll in the MS program.

GPA requirement - To be considered for the MS program, we require a minimum cumulative GPA of 3.0 in the last 60 credit hours of the undergraduate degree.

Application evaluation - Several factors are taken into consideration when evaluating a student's application: the student's cumulative GPA, major, institution, personal statement, standardized test scores, and performance in individual courses.

Deficiencies - Depending on prior academic preparation and accomplishments of an applicant, deficiency courses may be specified to ensure adequate background preparation. Please note that deficiencies are not intended solely as prerequisites for graduate coursework; they also satisfy the breadth requirement for all graduates of SE. Below is a list of deficiency courses along with the associated ASU course numbers:

- SER 222 Design and Analysis of Data Structures and Algorithms, OR CSE310 Data Structures and Algorithms
- CSE 240 Introduction to Programming Languages

- SER 334 Operating Systems and Networks, OR CSE330 Operating Systems
- CSE 360 Software Engineering

Deficiency coursework completed with a grade of "C" or better at the undergraduate level will satisfy the requirements. A grade of "B" or better is required for all assigned deficiency coursework at the post-baccalaureate level. Again, note under the previous section "Deficiencies" that an applicant to the program may be required to satisfy additional deficiency courses as determined by the program.

Option 1: Waiver Process - Students wishing to have their course syllabi examined as evidence that deficiencies have been satisfied must submit a petition. The request will need to be submitted using the [Petition for Reevaluation of Deficiency Course](#) form along with supporting documents such as a syllabus, catalog description, and university transcripts (including the grade scale), to prove that you have met the requirements. Be advised that the documents you uploaded during the admission application have been evaluated, so a reevaluation petition should only be submitted if you have **<u>new</u>** information to provide. Once the petition has been reviewed, it is final. There will be no future petition or consideration request. If, after evaluation, the petition is not approved, the student may choose to take the deficiency test-out examination.

Option 2: Deficiency test-out exam – Prior to fall and spring semesters, an online course proficiency examination (CPE) is provided to allow students entering with deficiencies (listed in the admission letter) to take a test to establish whether they possess basic knowledge of the course material sufficient to have an assigned deficiency waived. The cost for each subject examination is $59, payable at the time of registration. **This scheduled testing period is the only opportunity for deficiency test-outs. No other arrangements will be made for students to test out of assigned deficiencies.**

Option 3: Enrolling in the course. Students who could not clear their assigned deficiency through the waiver process or deficiency test-out exam are required to enroll and pass the course(s) in their first year.

Notice of Admission - SE submits its recommendation of admission to Graduate Admissions and the final notice of admission decision is sent in writing by Graduate Admissions. You may check your application status on My ASU.

Pre-admission credits and Transfer credit – Please refer to ASU's Graduate College policies and procedures. The SE program follows the Graduate College's allowable credits. **Approved transfer credit cannot count towards meeting the core requirement unless the credit was earned at ASU.**

Accelerated (4+1) degree program Admissions and Eligibility
The Accelerated (4+1) degree program allows a B.S. Software Engineering student to pursue a Master of Science in Software Engineering while completing the bachelor's degree. Hence, the Accelerated program has higher requirements and expectations than

the traditional MS in SE degree. The accelerated program allows a maximum of 12 credit hours to be shared with both their undergraduate and graduate programs.

Accelerated (4+1) students are required to adhere to the same admission application process and criteria as non-accelerated students as described in the previous section plus the following:

Eligibility. Students enrolled in the B.S. in Software Engineering may apply to the 4+1 B.S./M.S. Software Engineering degree option once they have earned 75 credits and can start taking shared courses once they have completed 90 credits. Applicants must have a minimum GPA of 3.2 at the time of application and maintain a GPA of 3.0 or higher for all coursework on the graduate program of study.

Satisfactory Progress as a 4+1 Graduate Student: All 4+1 students must maintain a GPA of 3.0 or higher (Cumulative, Graduate, and iPOS). If a student falls below a 3.0 GPA, they are placed on probation and provided the timeframe in which the GPA must be raised to the satisfactory level. Students who do not raise their GPA to a 3.0 within the provided timeline risk dismissal from the program. Please Note: any 500 level courses taken as an undergraduate student will immediately count towards your satisfactory progress GPA calculation once you become a graduate student.

VII.   **Formulation of the Plan of Study**
A student must submit a plan of study (iPOS) online through My ASU before the end of their first semester of attendance. The final iPOS is subject to approval by the Graduate Program Chair and the supervisory committee for thesis students. Thesis students need to finalize their committee in their 3rd semester. After approval at the school level, the iPOS is forwarded to the Graduate College for final approval. The iPOS must contain a minimum of 30 semester hours of approved graduate-level work.
Any assigned deficiency courses must be completed by the end of the 1st year. A grade of "B" or better average is required for deficiency courses, and a "B" must be achieved in each course. **Students who are deficient in CSE240 must satisfy the deficiency before taking SER502. Students who are deficient in SER222/CSE310 must satisfy the deficiency before taking SER501. Students who are deficient in CSE360 must satisfy the deficiency before taking SER515, or by being concurrently enrolled in CSE360 and SER515.** A grade of "B" or better in a graduate course that follows a prerequisite class does not waive this requirement.

Degree requirements, area of study courses, and comprehensive exams are defined **below**.

Students have the option to pursue the general degree or the cybersecurity specialization (refer to the end of the handbook for the comparison table). The three **core courses** from the courses listed below **must be completed by the end of the 18th credit hour applied to the Plan of Study** (three of the first six POS classes). These courses are intended to expose the student to the fundamental topics across the SE spectrum. A grade of "C" or

better must be achieved in each core course. Please note the core is not intended solely as a prerequisite for the graduate coursework, but it also satisfies the breadth requirement for all graduates in the program.

Required Core Coursework (9 credit hours) – general degree and cybersecurity specialization.
- SER 501 Advanced Data Structures and Algorithm Analysis (3)
- SER 502 Emerging Language and Programming Paradigms (3)
- SER 515 Foundations of Software Engineering (3)

Software Engineering Elective Courses (6 credit hours) – general degree and cybersecurity specialization

Two courses (6 credits) from the following list:
- SER516 Software Agility (3)
- SER574 Advanced Software Design (3)
- CSE563 Software Requirements and Specification (3)
- CSE564 Software Design (3)
- CSE565 Software Verification, Validation, and Testing (3)
- CSE566 Software Project, Process, and Quality Management (3)

General Degree: Free Elective Courses (9-12 credit hours, depending on the culminating experience)
- Maximum of 3 credits of approved SER4XX-level coursework.
- Maximum of 3 credits of approved CSE 500-level coursework, not including the CSE software engineering courses CSE563, CSE564, CSE565, and CSE566.
  - MS SE students should be advised that CSE courses have enrollment precedence set up for Ph.D. and MS students in CS. This often results in delayed enrollment in these electives for MS SE students limited by seat availability.
  - Graduate advisors and chairs in CSE and SER work together to make a limited number of CSE courses available for regular enrollment to SER students. Please talk with Graduate Advising to get the current list of these elective CSE courses.
- The remaining elective credits must be drawn from the SER5xx elective courses offered from the catalog, or by taking additional software engineering elective courses beyond the credits required above.

Cybersecurity specialization (9 credit hours):
- Required: CSE 543 Information Assurance and Security (3)
- Choose 2 courses from the following:
  - CSE 539 Applied Cryptography (3)
  - CSE 545 Software Security (3)
  - CSE 548 Advanced Computer Network Security (3)

- CSE 591 or 598 Cybersecurity-related such as "Computer Security: Techniques and Tactics". Contact advising if you have additional courses to consider.

Free Elective Courses (3 credits), if choosing Software Factory as culminating experience
- Must be drawn from the approved SER5XX/4XX elective courses offered from the catalog, or by taking additional software engineering elective course(s) beyond the credits required above.
- Maximum of 3 credits of approved SER4XX-level coursework

Culminating Experience Options (described below) – general degree and cybersecurity specialization

- Capstone: SER 517 Software Factory I (3) – in the last semester
- Thesis: SER 599 Thesis (6) over 2 semesters

The ASU Graduate College requires that all graduate students achieve a grade of B or better in the culminating experience; students not achieving this grade will need to repeat the culminating experience. **Students can take SER 517 a maximum of two (2) times.** A student will be removed from the program if he/she is not able to obtain a grade of "B" or better in the second attempt.

A student should expect to spend approximately 15-20 hours per week on the chosen Culminating Experience. Students must have no unsatisfied deficiencies when enrolling in thesis credits or the capstone course.

MS Capstone Option (3 credits):
MS students choosing the capstone option **must** register for SER 517 in the last semester of their studies unless an exception for extenuating circumstances is approved by the Graduate Program Chair. The capstone experience is designed to be a "synthesis" activity, where students are expected to demonstrate the degree program outcomes plus advanced technical competence and critical inquiry skills in the context of a complex project. The synthesis aspect means students should demonstrate, integrate, and apply the concepts learned during their graduate study.

Capstone projects may be culled from any number of sources at the discretion of the faculty, including research projects, industry-sponsored projects, entrepreneurial projects, open-source projects, and so on. Capstones are team projects at the discretion of the faculty. The assigned instructor(s) for SER517 will define the specific deliverables from a software engineering process perspective; however, the criteria will always be defined in terms of synthesis of the degree program outcomes, advanced technical competence, and critical inquiry. Deliverables in the courses may include source code, deployable software, report(s), and presentation(s). SER517 capstone projects are typically required to be presented at a poster session after the course.

MS Thesis Option:
MS students completing a thesis require a research advisory committee comprised of a committee chair and at least 2 additional committee members. The two members are chosen jointly by the committee chair and the student to facilitate the student's research. At least one member should be from the SE program faculty. Please refer to the back of the handbook for a list of area faculty and their research. The chair must be an approved SE graduate faculty member. CS graduate faculty with chairing rights may automatically co-chair an MS thesis and apply for full chair rights.

The software engineering faculty support multi-disciplinary research in partnership with the wide variety of research programs at ASU. Software engineering students may have faculty in graduate programs other than SE or CS co-chair a thesis, provided at least one research question of the thesis pertains to software engineering. Faculty members in other graduate research programs may also apply for full chairing rights on the SE graduate program faculty; interested faculty should inquire with the SE Program Chair through the SCAI Advising Office.

For MS students, the thesis and a successful oral defense constitute their final examination. A majority pass vote by the student's committee is required. For visa reasons, international students have a maximum of two semesters to finish the thesis after completion of coursework listed in the iPOS.

Thesis credits must be taken in consecutive semesters (Fall-Spring, Spring-Summer, Summer-Fall, or Spring-Fall) during the planned last 2 semesters of the student's program of study as indicated on the iPOS.

Steps to Preparing for Your MS Defense:
Prior to defense:
1. Obtain a consensus of approval from the committee chair and the committee members to proceed with the oral defense.
2. Schedule a date and time with your committee for the oral defense on MyASU.
3. Important: Ensure that a minimum of 50% of the official committee is physically present at the defense. If at least 50% of the committee cannot be physically present, the defense must be rescheduled. The same is true for virtual thesis defense.
4. Visit ASU's Graduate College website to familiarize yourself with the dates and deadlines for format approval.

10 days before the defense: These steps are required to be completed before 10 working days from the date of the oral defense.
1. Reserve a room with the SCAI SE administrative staff (Picacho 2nd Floor).
2. Submit an electronic version of your abstract with title, full names of your committee members, defense date/time/place, and your name as you want it to appear on the defense announcement to the SCAI Advising office (Picacho 245 Floor). In the defense announcement, include a Zoom link for participants who are not able to attend in person.

3. Schedule on MyASU your defense with ASU's Graduate College.

On the day of the defense:
1. Set-up all your equipment at least one half-hour prior to your presentation to make sure it works properly.

After the defense:
1. Your committee will have comments and a discussion with you. In the end, the committee makes a recommendation: Pass, Pass with minor revisions, Pass with major revisions, or Fail.
2. Revisions are normal and are expected to be completed within one year (usually much faster than this). This includes remaining registered until the finished document has been uploaded through MyASU on ProQuest.
3. Follow the steps on MyASU on uploading your final dissertation through the Graduate College and ProQuest.

Accelerated (4+1) Students:
4+1 students may share four courses (12 credits) on the B.S. and M.S. programs of study. Therefore, 4+1 students must complete 18 additional hours of coursework after completion of their bachelors degree, as defined above in the Software Engineering degree requirements. The current set of shared courses is SER501 and SER502, plus any 2 of SER421, SER422, SER423, SER431, SER432, SER450, SER456, and SER486. 4+1 students are allowed to count up to 6 credits of SER4xx on their iPOS. **Students pursuing the Cybersecurity specialization will need to take three graduate courses - SER 501, 501, and 515, and for the fourth course consult with the Graduate Advisor on what to take depending if they want to do a thesis or a non-thesis.** The SCAI Graduate Advising Office maintains the up-to-date list of approved courses. Students should check with Advising before completing a program plan.

Accelerated 4+1 students have the same set of Culminating Experience Options available to them as non-accelerated students. Please review the Culminating Experience Options section above. Be advised that 4+1 students opting to pursue the thesis option should plan to start their thesis at the start of the graduate year (the "+1" year) to ensure timely graduation.

The "4+1" option is designed to allow for completion of the Master's degree in one year. Accelerated 4+1 students who cannot complete in one year may re-apply to the non-accelerated program. If such a student has completed SER501 or SER502 at the time of dropping out, then those courses may still double count for the BS in SE and the MS in SE (non-accelerated). However, the two 4xx-level electives will no longer count as shared credits toward the masters and the student will be required to take two additional electives to fulfill the complete the masters degree requirements.

All MS students, accelerated or non-accelerated, are reminded that they are still bound by all degree constraints specified by the Graduate College, the Ira A. Fulton Schools of Engineering, and School of Computing and Augmented Intelligence.In some places, this

handbook provides more specific requirements. Please review these appropriate websites and consult with your academic advisor to understand these constraints.

VIII. General Information

A. Research Standards for Publication of Thesis

Graduate research is the study of an issue that is of sufficient breadth and depth to be publishable in an SE-related journal. The effort should reflect a minimum of 750 hours of thoughtful work for a thesis (M.S.). The research should follow a 'scientific method' and thus be objective. The thesis should demonstrate independent, original, and creative inquiry. There should be predefined hypotheses or developmental goals and objectives that are measurable and can be tested. The document should demonstrate proficiency with written English and should conform to the Graduate College format guidelines. For more information on format guidelines, please visit the Graduate College web site http://graduate.asu.edu. Publication of a research paper is not required for thesis defense.

B. Financial assistance and/or fellowships

There are limited funds for MS students. We encourage students to pursue assistantships outside SE and not limit their search to SE only. ASU does offer the undergraduate BS in SE online, and this creates opportunities for MS in SE candidates to receive Teaching Assistantships or hourly Grader positions. The best way to earn one of these positions is to achieve high marks in the SE core courses. Information regarding other sources of financial assistance is available on the following websites:

- Financial aid: https://students.asu.edu/financialaid

- Graduate College: https://graduate.asu.edu/pay-for-college

- Fulton: https://graduate.engineering.asu.edu/graduate-fellowships/

C. Continuous Enrollment and Leave of Absence Policies

Once admitted to a graduate degree program, master's students must be registered for a minimum of one graduate credit hour (not audit) during all phases of their graduate education. This includes periods when they are engaged in research, working on or defending theses or applied projects, or in any other way using university facilities or faculty time, including the term in which they graduate. This credit must appear on the *Plan of Study* or must be an appropriate graduate-level course (SER595 Continuing Registration). Courses with grades of "I" where the grade stays permanent, "W" and "X" are not considered valid registration for continuous enrollment purposes.

Students planning to discontinue enrollment for a semester or more must request approval for a leave of absence. Students may petition ASU's Graduate College for a leave of absence for a maximum of two semesters during their entire program. **Requests should have enough detail to understand the situation thoroughly and include a plan for continuing in a future semester.** The petition for a leave of absence must be endorsed by the members of the student's supervisory committee and the head of the

academic unit and approved by ASU's Graduate College Dean. This request must be filed and approved before the anticipated absence.

An approved leave of absence will enable students to re-enter their program without re-applying to the university. Students who do not enroll for a fall or spring semester without an approved leave of absence by ASU's Graduate College are considered withdrawn from the university under the assumption that they have decided to discontinue their program. A student removed for this reason may reapply for admission to resume their degree program; the application will be considered along with all other new applications to the degree program.

A student on an approved leave of absence is not required to pay fees, but in turn, is not permitted to place any demands on university faculty or use any university resources.

D. Maximum Time Limit

All work toward an MS degree must be completed within **six consecutive years**. The six years begins with the semester and year of admission to the program. Pre-admission graduate credit hours that are included on the Plan of Study must have been completed within three years of the semester and year of admission to the program. Pre-admission credit hours are not counted towards the maximum time limit.

E. Registration requirements for research assistants (RA) and teaching assistants (TA)

Students awarded an assistantship within the Ira A. Fulton Schools of Engineering are required to be registered for 12 credit hours (no more, no less). Audit credit hours do not count towards the 12 credit hours.

Students who obtain an assistantship outside the Ira A. Fulton Schools of Engineering are required to follow the policy of the unit that hires them.

TAs and RAs are treated as residents for tuition purposes. To be eligible for tuition remission, TAs and RAs must be employed a minimum of 10 hours per week (25 percent Full Time Equivalency {FTE}). TAs/RAs working 10-19 hours per week (25-49 percent FTE) receive a 50 percent tuition remission for the semester or summer session of their employment. TAs/RAs working 20 hours per week (50 percent FTE) do not pay tuition during the semester or summer session of their employment. Also, the university pays the individual's health insurance premium for those TAs and RAs working 20 hours per week (50 percent FTE). However, a student is responsible for other fees associated with the registration.

Note that graduate students may also be hired as Graduate Student Assistants (GSAs) to perform a range of functions for the unit, such as grader, tutor, lab assistant, and so on. These positions are usually funded as an hourly wage for up to 20 hours per week and **do not** come with any form of tuition assistance.

F. Satisfactory Progress, Academic Probation, Progress probation, and Withdrawal from the SE Program:

At the end of the student's first completed semester and every semester thereafter, the school will conduct an audit to determine if the student is maintaining the required minimum satisfactory progress, including progress on academic (GPAs and deficiencies) and probationary issues. Any student that is not in compliance with the satisfactory academic/ progress requirements is notified that she/he is either

- on academic probation and is given the next 9 credit hours or two semesters (fall and spring) to bring the GPA up to the proper level or
- on continued progress probation and is required to meet the conditions outlined in the continued probation letter.

Failure to properly remediate the GPA or the conditions outlined in the letter within the time frame will result in the school recommending that the student be dismissed from the program.

Note: Fully admitted students who take optional summer courses are placed on probation after the summer term if the earned grade(s) causes their GPA to fall below the satisfactory progress GPA minimum.

If applicable, the above-noted audit will also review each student's progress towards removing enrollment deficiency courses and/or any other degree requirement milestone(s). Failure to satisfactorily complete all deficiency course(s) and/or required milestones by the stipulated deadline may result in a recommendation for dismissal to the Graduate College.

Each semester, the Software Engineering Program reviews students' files for satisfactory progress towards completion of the degree. All students are placed in one of the five categories:

1. Satisfactory progress
2. Academic probation
3. Progress probation
4. Dismissal from the SE program
5. Dismissal from the accelerated 4+1 program

1. **Satisfactory progress** means that the student does not have any academic and progress probationary issues. In addition to the probationary rules, satisfactory progress includes communication each semester with the student's Committee Chair regarding his or her progress.

2. **Academic probation** pertains to grades that might affect Program and University policies, including graduation. The following are reasons why a student may be placed on academic probation. Reasons for probation will be stated in the letter a student receives from the department when they are notified of the academic probation status.
   - GPA below 3.0 in approved POS courses.
   - Overall -post-baccalaureate GPA below 3.0.
   - Overall graduate (500 level or above) GPA below 3.0 (does not apply to accelerated 4+1 students just completing their first shared course in their senior year; so last bullet for the senior year expectation for 4+1 graduate students).
   - All required deficiency courses have not been completed with a grade of "B" or better by the end of the first year.
   - (Accelerated 4+1 students) The GPA in shared courses between the BS and MS drops below 3.0.

3. **Progress probation** pertains to issues dealing with making progress towards a degree. The following are reasons why a student may be placed on progress probation. Reasons for probation will be stated in the letter a student receives from the department when they are notified of the progress probation status.
   - Lack of Progress toward removing deficiencies as listed in your admission letter.
   - Lack of Progress toward completing the three Core courses within the first 18 credit hours of POS courses.

4. A student is recommended for **dismissal from the SE Program** if she or he fails to meet the probationary standards placed upon her or him in the semester mentioned in the probationary letter. The student will receive a letter from the Software Engineering Program explaining the reasons for the dismissal. The student will have 5 working days from the date of the letter to appeal the decision. The SE Graduate Program Committee (GPC) will review the case and will make the necessary recommendation. The Graduate Program Chair, on behalf of the GPC, will provide a written explanation of the outcome. If the outcome is favorable, the student will have to meet all outlined requirements by the end of the specified period. The student will be required to sign an agreement acknowledging the recommendations and the consequences if the agreements are not met. If the GPC recommends that the appeal not be granted in favor of the student, the Graduate Program Chair, on behalf of the GPC, will recommend to the Dean's Academic Affairs that the student be dismissed from the MS SE Program. The notice of recommendation and the appeal will be forwarded to the Ira A. Fulton Schools Standards Committee to review the case and make the final ruling to the Associate Dean and the SE Program. If the appeal is not granted in favor of the student, the Dean's Academic and Student Affairs will recommend to the Office of Graduate College that the student be dismissed from the SE MS

Program. Please refer to the Office of Graduate College catalog on policies and procedures or contact the graduate advisor in the SCAI Advising Center.

Students may be immediately recommended for dismissal from the MS in SE for repeated violations of the University's, Fulton Schools of Engineering and SCAI for a single violation of these policies that is judged by the SE GPC to be particularly egregious (deliberate and negatively impacting a large number of students).

5. Additionally, a student is recommended for **dismissal from the accelerated 4+1 program** if they do not complete the four shared courses listed on the 4+1 plan with a GPA of 3.0 or higher, or if they receive below a "C" grade in any of the four courses. A 4+1 student may also be dismissed for not completing the "+1" program requirements in one academic year. These conditions, due to their timing, *may cause an immediate recommendation for dismissal without a prior probationary letter*. Dismissal from the 4+1 program is distinct from the requirements for completing the undergraduate BS in SE. Further, the student may be eligible for admission to the non-accelerated MS in SE with an ability to re-use completed graduate coursework that was not shared toward the MS degree.

G. Academic Integrity
The highest standards of academic integrity are expected of all graduate students, both in the academic coursework and in their related research activities. The failure of any graduate student to meet these standards may result in serious consequences including suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies of individual colleges as well as the university. All students are required to complete an independent academic integrity course module during their first semester in the program. Students are provided details of this requirement on MyASU under "Priority Task."

Violations of academic integrity include, but are not limited to: cheating, fabrication, tampering, plagiarism, or aiding and/or facilitating such activities. At the graduate level, it is expected that students are familiar with these issues and each student must take personal responsibility in their work. Also, graduate students are expected to follow university guidelines related to the Student Code of Conduct. University policies related to academic integrity and code of conduct are available in ASU's Graduate College, or at https://graduate.asu.edu/academic-integrity and https://eoss.asu.edu/dos/srr/codeofconduct respectively.

H. Filing for Graduation

During the final semester, a student must file an application for graduation with the Graduation Office of the Registrar through My ASU. The student's approved final plan of study (iPOS) must be on file with Graduate College before the student can apply for graduation.

I. SER 584 - Internship

Internship or Curricular Practical Training (CPT) is an academic experience usually obtained at off-campus work settings, allowing the student to apply knowledge and skills gained in various classes. It is intended as a unique, hands-on learning experience to provide students with several valuable skills that they can use upon graduation from their graduate degree programs. Accordingly, it is not available to full-time or part-time workers regularly employed by the company where the internship is proposed.

All students (domestic and international) may take part in an out-of-state internship during the summer session. The eligibility requirements for CPT internships remain the same as mentioned.

International students must work with the International Students and Scholars Center (ISSC) and submit additional documentation to obtain work authorization. To receive credit for the internship experience, students must include the internship course SER 584 (1 credit hour) as an integral part of their Program of Study, reflected by their approved iPOS.

The addition of the internship course(s) should be done at the initial submission of the student's iPOS during the first semester of study. (Note that each student is required to file an iPOS by the end of his/her first semester of study). Later additions of the internship course(s) must be requested and approved at least one full semester (fall, spring or summer) prior to the proposed start date of the internship course. For example, a student planning to do an internship during the summer semester should have an approved iPOS with the internship course before the beginning of classes in the preceding Spring semester. The Internship course cannot be added to an approved iPOS once all coursework has been completed. Exceptions may be made if the internship is relevant to the thesis research. In such cases, the SE Program Chair will determine the need for a CPT internship in consultation with the Graduate Academic Advisor.

The Graduate Program Committee will determine the need for a CPT internship in such cases in consultation with the Graduate Academic Advising Office. Note that approval of an iPOS with the SER 584 course confirms that the internship is an integral part of the degree requirements as planned by the student. A student may enroll in a maximum of 3 separate 1 credit hour sections of SER584 on the iPOS, and may split these into multiple 1-credit repeated enrollments of SER584 with approval of the Graduate Program Chair. An additional internship that is not part of the 30 credit hours can be removed from the iPOS. Note: Only internship courses can be removed from the iPOS. Courses that are

approved as part of the overall degree program in the iPOS can only be substituted with another approved coursework.

To be eligible for an internship, a student must be in **good academic standing*.**
•   Summer: 3.0 GPA required to do an in state or out of state, full or part time.
•   Fall/spring semesters: GPA between 3.0 – 3.49 may participate in an in-state part time internship only. A campus presence is required.
•   Fall/spring semesters: GPA 3.5 or higher may participate in an in state or out of state internship, full or part time. A campus presence is required.

Full-time CPT is 21 hours more. Part-time CPT is 20 hours or less.

For students doing CPT in their last semester, the end date is the conferral date.

*GPA requirement specified above applies to all 3 GPA's – cumulative, graduate, and iPOS GPA.

During the regular Fall and Spring semesters, international graduate students in F-1 status must register for a minimum of nine (9) credit hours to maintain full-time status and be enrolled in six (6) credit hours of in-person, on-campus coursework at the ASU campuses. A maximum of three (3) credit hours of online courses are being permitted. The SER 580 Practicum course will not count as satisfying the student's "physical presence" at ASU.

Application steps for applying for SER 584 Internship (CPT) can be found at https://sites.google.com/asu.edu/scai-cpt/ .. Required documents must be submitted through the online Override Request Tool at least 3-4 weeks before the requested start date of the internship. Students will not be able to request late-add registration of the SER 584 Internship credit to their class schedule after the drop/add deadline of each semester.

An approved CPT offer packet is required _before_ commencing the internship. The request will include a statement from the employer that indicates they understand that the work is to satisfy a degree requirement. A sample letter and other required forms are available from the Graduate Advising Office. Students must receive approval from their faculty advisor and the Graduate Program Committee before registering for SER 584. A final Plan of Study must be filed with ASU's Graduate College showing the Internship course before registering for SER 584. All application materials for an Internship must be completed by the last day of regular registration for any semester. The student must take classes appearing on the Plan of Study the semester following the internship.

Renege: (verb) to fail to carry out a promise or commitment

It is unethical for students to continue to seek or consider other employment opportunities once they have accepted an offer. SCAI expects students to honor an acceptance and discontinue all employment-seeking activities upon accepting an offer. Students who accept an offer from an organization and later renege/decline the offer will be prohibited from further requesting future internships pending a meeting with the SCAI Director, Assistant Director, or Software Engineering Graduate Program Chair.

A final report is required before a grade and credit is given. The final report must be submitted to the reporting industry supervisor for comments and approval before completing the internship, then thesis students are required get to the faculty advisor for comments and final approval. Non-thesis students require the industry mentor and then submit it for the Program Chair's review. The final report is expected to be approximately 5 pages long (not counting images) and follow the following outline:

I.   Company and specific division of the internship background.
II.   Summary of desired learning outcomes of the internship (should reflect what was stated on the internship application).
III.   Requirements of the internship as defined by the industry sponsor.
IV.   Summary of contributions the intern made to the sponsor organization.
V.   Summary of learning outcomes achieved, including 1) a summary of what courses in the student's iPOS contributed to the internship and how, and 2) a summary of how the internship experience will inform the student's research experience at ASU (if a thesis or IAP culminating experience is on the iPOS).

In keeping with the expectations of a graduate student, final reports should be original, well-written documents. Final reports will also be evaluated for proper references, citations, and quotations, as well as formatting, spelling, and grammar. Plagiarism in any form will result in immediate rejection of the report and an Academic Integrity Violation going on file for the student. Two rejections of the final report will result in non-acceptance of the 584 credit and the student will have to enroll in one of the credit options above.

J. SER 590 Reading and Conference

SER 590 Reading and Conference (Independent Study) is available for all MS students. The student must get written approval from the supervising faculty outlining the coverage of the content. The Independent Study form must be approved by the Graduate Program Chair and will be placed in the student's file.   Students are allowed to take three times the SER 590 for 1 or once for 3 credits hours. A maximum of 3 credit hours is allowed on the iPOS.

K. Instructional Concerns and Course-Related Complaints

Being part of a large university creates opportunities to learn from a diverse instructor population with different teaching styles and modalities for delivering course content. Courses are offered by a diverse set of faculty, including those who are research-intensive, those whose primary responsibility is teaching, GSA/TA instructional staff and part-time faculty who are working in the field. Based on enrollment or modality of

offering, faculty may also be supported by graduate student teaching assistants, GSA's and graders. This diverse higher education delivery platform may differ significantly from previous experiences, and while it provides an opportunity to expand the student's ability to learn and develop problem-solving skills, concerns and conflicts with requirements and instructors may occasionally arise. SCAI students with instructional concerns should review and adhere to the following guidelines for attempting to resolve their issues. First and foremost, keep in mind that the faculty and advising staff are experienced, dedicated educators that are here to help you achieve your educational goals. At the same time, they have a responsibility to ensure standards are maintained and student outcomes are achieved before graduation. The university culture recognizes the value of diversity in multiple dimensions and the presumption of expertise and academic freedom of the faculty.

Communicate with your Instructor

If you have a difference of opinion with your instructor, teaching assistant (TA) or graduate support assistant (GSA) or have concerns about technical or administrative aspects of the course, visit the instructor or TA/GSA during office hours or contact them via email (if you cannot visit them during the office hours). Express your concerns clearly and respectfully and ask for help. Be sure to provide concise information about what you have trouble understanding in the course or your concern. Instructors and GSA or TAs are here to help. Remember that you are responsible for prerequisite knowledge/skills required for a course and regularly studying the material taught in the course. The teaching staff may not be able to help you with your problem if you lack the prerequisite knowledge/skills or have not been keeping up with the course material. As a guideline, for a 15-week course, you should spend three hours study time every week for each hour of course credit. Thus, you should schedule 8-10 hours each week to devote to each three-credit course. For a 7.5-week course, students should be prepared to spend 6 hours a week on coursework for every course credit. So, you should expect to spending approximately 18 hours a week on coursework for a three-credit course. Also, make sure to resolve the issues as soon as they occur and maintain all documentation. For example, if the assignment instructions are not clear, get the clarification on the day the assignment is assigned and do not wait until the assignment's deadline.

If you are still having problems in the course after communicating to your instructor, TA or GSA, connect with your academic advisor to understand your options moving forward.

Connect with your Program Chair

If you are unable to resolve the concern after initial contact with the instructor GSA or TA, and you have met with your academic advisor, you should then connect with the program chair for your degree (or the department offering the course). The program chair will confer with the instructor and/or GSA/TA to better understand the concern and try to resolve the problem. Please note that before meeting with the program chair, you should have made a reasonable effort to meet with the course instructor (not just the support

GSA or TA) and get the issue resolved. When contacting the program chair, provide all the relevant details such as the course syllabus, assignment handout, email exchange with the instructor, etc. so that the program chair can promptly act on your concerns. Please be brief and precise in the description of your concerns. In some cases, the graduate program chair would like to meet you. When coming for the meeting, bring along all the relevant documents.

If the instructional concern is not resolved with the program chair or the department offering the course, contact the Associate Dean of Academic Affairs Office for the college offering the course for assistance through the grade grievance process https://engineering.asu.edu/grade-grievance/ .

Remain Focused
When faced with instructional concerns, it is important to remain focused on the rest of the course while addressing specific areas that are under review. Be sure to stay connected with your academic advisor if there are any changes in your situation.
NOTE:
- Misrepresentation of facts or disrespectful behavior when confronting your instructor or teaching assistant is considered an academic integrity violation.
- Maintain all documentation.
- Act proactively and promptly.

Guidelines for Avoiding Problems
- Be sure you have the necessary prerequisite knowledge before starting a course;
- Attend class and on-line exercises regularly;
- Devote time each week to studying to avoid getting behind;
- Contact the TA (if assigned) or instructor during office hours at first sign of trouble and come prepared to ask precise questions and to explain your difficulty
- Accept the fact that you grow intellectually and professionally by being challenged and learning to deal with diverse expectations and environments.

Process for Resolving Conflicts in Grading, Course Expectations, etc.
- Contact the TA (if available) or instructor to explain your concern and seek resolution;
- If the TA/instructor has attempted to assist you, but you are still having an academic difficulty that is causing personal stress or hindering your academic success, see your Academic Advisor;
- If the TA/instructor is not responsive or does not provide a legitimate response/accommodation, then contact your Graduate Program Chair.

- If you still feel there is a legal, ethical or procedural violation that is victimizing you, contact the Office of the Associate Dean of Engineering for Academic Affairs.
- Circumventing this process will be considered a violation of professional ethics and protocol.
- See ASU's policy for Grade Appeals https://catalog.asu.edu/appeal

L. Student chapters of professional societies

Our graduate students are involved in many professional societies, most commonly Association for Computing Machinery (ACM) and the Institute for Electrical and Electronics Engineers Computer Society (IEEE Computer Society). Most branches of Software Engineering have professional societies associated with them. Participation in professional societies is an excellent road to career and interest group connections. Student membership typically costs less than $30 and includes many benefits, including a monthly magazine. Professors will be happy to sign a membership form that will entitle a student to reduced rates. The ASU student chapter of ACM and the Polytechnic Computing Students Association are popular among MSSE students.

Please review the Orientation video for your degree program. The video is available through Canvas in your My ASU.

Software Engineering Graduate Faculty Approved to Chair MS SE Thesis

Ajay Bansal, Ph.D.; Assistant Professor (chair)
The University of Texas Dallas (CS)
Programming languages, logic programming systems, software engineering, automated reasoning, and knowledge representation.

Srividya Bansal, Ph.D.; Associate Professor (chair)
The University of Texas Dallas (CS)
Semantic-based approaches to big data integration, Web service description, discovery and composition, and tools for outcome-based instruction design in STEM education.

James Collofello, Ph.D.; Professor, SCAI (chair)
Northwestern University (CS)
Software engineering, software project management, software quality assurance

Mike Findler, Ph.D.; Lecturer (chair)
Wright State University (Human Factors Engineering)

Kevin Gary, Ph.D.; Associate Professor (chair)
Arizona State University (CS)
Software architecture, software process, agile methods, and open source software. Web and mobile applications in healthcare and e-learning.

Javier Gonzalez-Sanchez, Ph.D.; Lecturer (chair)
Arizona State University (CS)
The intersection of software engineering and human-computer interaction focused on the development of tools, methodologies, and practices that help developers in the engineering of innovative human-centric technologies leveraged by pervasive, context-aware, and adaptive capabilities

Robert Heinrichs, Ph.D.; Lecturer (chair)
Technische Universität Berlin, Germany

Alexandra Mehlhase, Ph.D.; Lecturer (chair)
Technische Universität Berlin, Germany

Classification of different types of variable-structure models. Development of methods to model variable-structure models independent of a specific modeling language. Formalization of variable-structure models and their simulation in Object-Z.

Steve Yau, Ph.D.; Professor, SCAI (chair)
Trust management and security, software engineering, distributed systems, service-based systems, ubiquitous/pervasive computing

The following non-SE faculty have been approved to chair or co-chair SE culminating experiences:

Nathan Johnson, Ph.D.; Assistant Professor, The Polytechnic School (co-chair)
Iowa State University (Mechanical Engineering)
Complex systems, modeling and simulation, engineering computation, embedded systems

Robert LiKamwa, Ph.D.; Assistant Professor, School of Arts Media and Engineering (chair)
Rice University Ph.D. (ECE)
Mobile systems, energy-efficient computing, operating systems, visual sensing systems, augmented reality, virtual reality, mixed reality.
http://meteor.ame.asu.edu

Dragon Boscovic, Ph.D. (co-chair)
University of Bath (EE and CS)

Chitta Baral, Ph.D; Professor, SCAI (chair)
University of Maryland (CS)
Knowledge representation, temporal logics, logic programming, dynamic systems, text extraction, question answering, natural language semantics, bioinformatics

Additionally, all faculty approved with chair rights on the SCAI CE/CSE Graduate Programs Faculty automatically have rights to co-chair a culminating experience in the SE program.

Link to CS faculty with chair and co-chair rights: https://graduateapps.asu.edu/graduate-faculty/degree/G2

MS in SE	MS in SE – Cybersecurity Specialization
Required Coursework (9 credits) • SER 501 Advanced Data Structures and Algorithm Analysis (3) • SER 502 Emerging Language and Programming Paradigms (3) • SER 515 Foundations of Software Engineering (3)	Required Coursework (9 credits) • SER 501 Advanced Data Structures and Algorithm Analysis (3) • SER 502 Emerging Language and Programming Paradigms (3) • SER 515 Foundations of Software Engineering (3)
Software Engineering Elective Courses (6 credits) • Two courses (6 credits) from the following list: SER516, SER574, CSE563, CSE564, CSE565, or CSE566.	Software Engineering Elective Courses (6 credits) • Two courses (6 credits) from the following list: SER516, SER574, CSE563, CSE564, CSE565, or CSE566.
Culminating Experience Options (3-6 credits) • Capstone: SER 517 Software Factory I (3 credits) • Thesis: SER 599 Thesis (6 credits) over 2 semesters	Culminating Experience Options (3-6 credits) • Capstone: SER 517 Software Factory I (3 credits) • Thesis: SER 599 Thesis (6 credits) over 2 semesters
Free Elective Courses (9-12 credits), depending on the culminating experience) • Maximum of 3 credits of SER4XX-level coursework. • Maximum of 3 credits of CSE 500-level coursework, not including the CSE software engineering courses CSE563, CSE564, CSE565, and CSE566. • The remaining elective credits must be drawn from the SER5xx elective courses offered from the catalog, or by taking additional software engineering elective courses beyond the credits required above.	Cybersecurity Emphasis (9 credits): ● CSE 543 Required ● Choose 2 courses from the following: CSE 539, 545, 548, or Cybersecurity-related 591 such as "Computer Security: Techniques and Tactics"
	Free Elective Courses (0 -3 credits), if choosing Software Factory as culminating experience) • Must be drawn from the SER5XX/4XX elective courses offered from the catalog, or by taking additional software engineering elective course(s) beyond the credits required above. • Maximum of 3 credits of SER4XX-level coursework

Template comparison of the general/specialization

Cyber Security Courses:

CSE 543 Information Assurance and Security (Fall & Spring)
CSE 539 Applied Cryptography (Spring)
CSE 545 Software Security (Fall & Spring)
CSE 548 Adv Computer Network Security (Spring)
CSE 591 Current Topics in Cybersecurity (Fall)