

Computer Science
MCS Graduate Handbook
2015 - 2016



**MANUAL OF THE MASTER OF COMPUTER SCIENCE DEGREE
AND
CONCENTRATIONS**

ARIZONA STATE UNIVERSITY

2015 - 2016

CSE graduate degrees please contact:

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I. Introduction to the Computer Science Program

The Master of Computer Science (MCS) is a non-thesis degree, ideal for students with undergraduate education in computer science or related studies. This degree features advanced course work and provides numerous opportunities for interdisciplinary study. Within this degree, students can concentrate their studies in the following areas: Big Data Systems (BDS) and Information Assurance (IA).

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 Education policies and procedures and the computer science program requirements. In these cases, CSE has established higher standards. Students must satisfy both sets of requirements. Please note that policies and procedures are occasionally amended to improve the program. Changes will be communicated to students through e-mail, and posting on the paper and online bulletin boards.

III. Student responsibility

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 Office of Graduate Education – <http://graduate.asu.edu>
- Graduate Education policies and procedures <https://graduate.asu.edu/policies-procedures>
- The Computer Science Program – <http://cidse.engineering.asu.edu/forstudent/graduate/computer-science/>
- The International Students and Scholars Center – <https://international.asu.edu/>, if applicable.
- The Ira A. Fulton Schools of Engineering – <http://engineering.asu.edu>

IV. Faculty responsibility

The members of the faculty of computer science have diverse backgrounds and knowledge. They are available to assist you in your plan of study and your educational and career goals. We encourage you to take the opportunity to make individual appointments with faculty members with whom you have common interests. Please refer to the list of the faculty names, areas of expertise, and research interest on [CIDSE Website](#).

V. Admission and eligibility to the MCS degree programs

The Master of Computer Science (MCS) degree requires a background in engineering, 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, Informatics, and Decision Systems Engineering Advising Center to obtain advice on their educational pursuits.

Eligibility - Prior to applying to the MCS program, students are required to have completed three semesters or 12 credit hours of calculus, including multivariate calculus.

Application - All students are required to submit an application with the Office of Graduate Education and pay the required fee in order to have their application properly processed.

Application deadlines – December 1 for Fall and August 1 for Spring:

To receive full consideration, we ask that you have all the required documents submitted by the deadline.

GRE scores - All students, except ASU undergraduate CSE, are required to submit official general Graduate Record Examination (GRE) scores directly to the Office of Graduate Admission. The average GRE scores for students admitted into the MCS program have been 153 or 63 percentile Verbal, 163 or 88 percentile Quantitative, and 4.0 Analytical. However, admission decisions are made on the basis of the entire application packet. We do not require specific subject GRE scores. The ASU Institution code is 4007. If department code is required use 000 for GRE.

TOEFL/English Proficiency - 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 (IETLS) scores. CSE uses 575 (paper-based) or 90 (internet-based) TOEFL or 7 for IETLS as minimum expectations for admission. Note that your application will not be processed until the university receives official TOEFL 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 TOEFL waived. They should consult the Office of Graduate Admissions. Please address all TOEFL questions to the Office of Graduate Admission. The ASU institution code is 4007. If department code is required, use 99 for TOEFL.

Personal statement - The application must include a personal statement. The statement should explain professional goals and reasons for desiring to enroll in the MCS program.

Letters of recommendation - CSE requires three (3) letters of recommendation, at least one of which must come from former faculty. There is no standard form for letters of recommendation. Our current application process allows students to submit the letter of recommendations electronically by indicating the names and the e-mails of the recommender. In turn, the Office of Graduate Education sends an e-mail to the recommender alerting him or her to go online and submit a recommendation. We encourage letters from people who know you well, such as teachers, professional associates and supervisors. Ask people who can comment on your academic, emotional, intellectual and professional development.

GPA requirement - To be considered for the MCS program, we require a minimum cumulative GPA of 3.25 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, letters of recommendation, 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.

Below is a list of pre-requisites along with the associated ASU course numbers:

- CSE 230 - Computer Organization and Assembly Language Programming
- CSE 310 - Data Structures and Algorithms
- CSE 330 - Operating Systems
- CSE 340 - Principles of Programming Languages
- CSE 355 - Introduction to Theoretical Computer Science
- CSE 360 - Introduction to Software Engineering

Assigned deficiency courses must be completed by the end of the first academic year. A "B" or better average is required for deficiency courses, and a "B" must be achieved in each course. A grade of "B" or better in a course that follows a prerequisite class does not waive this requirement.

Waiver Process: Students wishing to have their course syllabi examined as evidence that deficiencies have been satisfied must submit a petition form. Submit an e-mail to cidse.advising@asu.edu with the [Petition for Reevaluation of Deficiency Course](#) form and supporting documents (such as syllabus, catalog description, or university transcripts) to prove that you have met the requirements. Be advised that the documents you uploaded during the admission application have been evaluated. Submit only **new** information when requesting a reevaluation of assigned deficiencies. 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.

Deficiency test-out exam - On the day before Welcome Day in fall and spring semesters, a classroom will be set aside to allow students entering with deficiencies (listed in the admissions letter) to take a test to establish whether they possess basic knowledge of the course sufficient to have an assigned deficiency waived. Students may take up to three test-out exams. **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.**

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.

Notice of Admission - CSE submits its recommendation of admission to the Office of Graduate Education and the final notice of admission decision is sent to the applicant in writing by the Office of Graduate Education. You may check your application status on My ASU (my.asu.edu).

Pre-admission credits and Transfer Credit

A student can transfer a maximum of six (6) credit hours of graduate coursework from another accredited institution, as specified in the ASU Graduate Catalog. A student must prove the graduate-level credit hours with grades of “B” or better were not used towards a previous degree, per Graduate Education policy. Pre-admission credits must have been taken within three years of admission to the ASU degree program to be accepted. A course with a grade of “Pass”, “Credit”, or “Satisfactory” is not acceptable for transfer. A student who wishes to transfer credits from another institution should contact the graduate advisor in the CIDSE Advising Center to initiate the transfer credit process.

Transfer between programs

A student who would like to switch from a Ph.D. to a Master’s or switch Master’s degree programs in Computer Science should follow the Computer Science Degree Change process. With approval, nine credit hours are eligible to transfer into the Master’s program. Transfer (pre-admission) courses must have been taken within the last three years with an earned grade of “B” or better and were not used toward a previous degree.

Students who want to change from a Master’s to a Ph.D. in Computer Science must submit a new application with ASU Graduate Education. Admission to the Ph.D. program can be denied. If admitted, the student is allowed to transfer only 12 credits from the original uncompleted program to the new program.

VI. MCS Degree Requirements

Degree requirements for the MCS include a minimum of 30 semester hours beyond deficiency courses.

The MCS is comprised of three major milestones, which all students are required to complete successfully prior to graduation:

- a) Completion of coursework,
- b) Filing an approved plan of study
- c) Successful completing a project portfolio.

An accelerated computer science degree (4+1) program for ASU undergraduate computer science and computer systems engineering students is available. There are also concentrations in Information Assurance and Big Data Systems. The requirements for the different programs are below.

a. Formulation of the Plan of Study

A student needs to submit a plan of study (iPOS) online through MyASU before the end of their first semester of attendance. The final iPOS is subject to approval by the supervisory committee and by the Graduate Program Chair. After approval at the School level, the final iPOS is forwarded to the Graduate Education Office for approval.

The iPOS must contain a minimum of 30 semester hours of approved graduate-level work. At least 24 of these hours must be CSE-5XX credits at ASU. A maximum of four CSE 598 courses may be allowed as elective coursework, which cannot include courses taken at the undergraduate level. All 30 semester hours must be from formal course work (including CSE 591). CSE 590 will not be allowed as part of the MCS program.

All MCS students must take and pass at least three credit hours in each of the three core areas: Foundations, Systems and Applications and earn a grade of B or better in all area courses. All MCS students must complete a project portfolio from three courses in which the student received a "B" (3.00) grade or higher.

*Note: **Effective Fall 2014** new incoming students were not allowed to count any 598 courses toward the core focus areas per Graduate Education to comply with policy. Students prior to Fall 2014 admission were grandfathered and will be allowed to complete their degree with the old requirements.

Approved 400 and 4XX/5XX level Effective Spring 2016: A maximum of 6 credit hours of 400-level coursework is allowed. A maximum of 12 hours of a combination of 400-level and cross-listed courses (4XX/5XX) is allowed. If a 400-level course is cross-listed with a 500-level course, students will be required to enroll in the 500-level. Students who have taken any of the 4XX courses as 598 cannot take the same class at the 400-level.

MCS in Computer Science

Program requires the following: 30 credit hours and a portfolio.

Required Core Courses: 9 credit hours

- Foundations (3)
- Systems (3)
- Applications (3)

Elective Courses: 21 credit hours

Students choose 21 credit hours of other elective course work approved by their academic advisor. Coursework selected as part of the area core may not be used as elective coursework on the same plan of study.

Culminating Experience: Project Portfolio, 0 credit hours

MCS in Computer Science (Information Assurance)

Program requires the following: 30 credit hours and a portfolio.

Required Core Courses: 9 credit hours

- Foundations (3)
- Systems (3)
- Applications (3)

Required Concentration Courses: 15 credit hours of coursework in information assurance.

12 credit hours from:

- CSE 539 Applied Cryptography (3)
- CSE 543 Information Assurance and Security (3)
- CSE 545 Software Security (3)
- CSE 548 Advanced Computer Network Security (3)

And 3 credit hours from the following

- CSE 531 Distributed and Multiprocessor Operating Systems (3)
- CSE 534 Advanced Computer Networks (3)
- CSE 565 Software Verification, Validation, and Testing (3)
- . CSE 466 Computer Systems Security (3)
- . CSE 467 Data and Information Security (3)
- . CSE 469 Computer and Network Forensics (3)

*Electives: 6**

*If a student selects any of the concentration courses that are also listed as a core area course, additional coursework may be required to complete the degree. Students should check with their academic advisor to ensure that the total credit hours of their plan of study are equal to 30.

Culminating Experience: Project Portfolio, 0 credit hours

MCS in Computer Science (Big Data Systems Concentration)

Program requires the following: 30 credit hours and a portfolio.

Required Core Courses: 9 credit hours

- Foundations (3)
- Systems (3)
- Applications (3)
-

Required Concentration Courses: Following 9 credit hours

- CSE 510 Database Management System Implementation (3)
- CSE 512 Distributed Database Systems (3)
- CSE 572 Data Mining (3) or IEE 520 Statistical Learning for Data Mining (3)

*Electives: 6 credit hours from the following**

- CSE 515 Multimedia and Web Databases (3)
- CSE 546 Cloud Computing (3)
- CSE 573 Semantic Web Mining (3)
- CSE 575 Statistical Machine Learning (3)
- CSE 578 Data Visualization (3)

*Electives: 6 **

*Additional elective coursework may be required. If a student selects any of the concentration courses that are also listed as a core area course, additional coursework may be required to complete the degree. Students should check with their academic advisor to ensure that the total credit hours of their plan of study are equal to 30.

Culminating Experience: Project Portfolio, 0 credit hours

VII. General Information, Policies and Procedures

a. Financial assistance and/or fellowships

There are limited funds for MS thesis and PhD. students. We encourage students to pursue assistantships outside of CSE, not limiting your search to CSE.

b. Continuous Enrollment

Once admitted to a graduate degree program or graduate certificate program, students must be registered for a minimum of one credit hour during all phases of their graduate education, including the term in which they graduate. This includes periods when students are engaged in research, working on or defending theses, or in any other way utilizing university resources, facilities, or faculty time.

Registration for every fall semester and spring semester is required. Summer registration is required for students taking examinations, completing culminating experiences, defending theses, or graduating from the degree program.

To maintain continuous enrollment the credit hour(s) must:

- Appear on the student's Plan of Study, OR
- Be research (592, 792), thesis (599), dissertation (799), or continuing registration (595, 695, 795), OR
- Be a graduate-level course.

Grades of "W" and/or "X" are not considered valid registration for continuous enrollment purposes. "W" grades are received when students officially withdraw from a course after the add/drop period. "X" grades are received for audit courses. Additionally, students completing work for a course in which they received a grade of "I" must maintain continuous enrollment as defined previously. Graduate students have one year to complete work for an incomplete grade; if the work is not completed and the grade changed within one year, the "I" grade becomes permanent. Additional information regarding incomplete grades can be found at <http://asu.edu/aad/manuals/ssm/ssm203-09.html>.

c. Leave of Absence Policies

Graduate students planning to discontinue registration for a semester or more must submit a Request to Maintain Continuous Enrollment form. This request must be submitted and approved before the anticipated semester of non-registration. Students may request to maintain continuous enrollment without course registration for a maximum of two semesters during their entire program.

Having an approved Request to Maintain Continuous Enrollment by Graduate Education will enable students to re-enter their program without re-applying to the university. Students who do not register for a fall or spring semester without an approved request are considered withdrawn from the university under the assumption that they have decided to discontinue

their program. Students removed for this reason may re-apply for admission to resume their degree program; the application will be considered along with all other new applications to the degree program.

A student with a Graduate Education-approved Request to Maintain Continuous Enrollment is not required to pay tuition and/or fees, but in turn is not permitted to place any demands on university faculty or use any university resources. These resources include university libraries, laboratories, recreation facilities, or faculty time.

d. Maximum Time Limit

Master's students must complete all program requirements within a six-year period. The six-year period starts with the semester and year of admission to the Master's program. Graduate courses taken prior to admission 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 (previously awarded master's degrees used on the Plan of Study are exempt).

Any exceptions must be approved by the supervisory committee and the Office of Graduate Education dean. The Office of Graduate Education may withdraw students who are unable to complete all degree requirements and graduate within the allowed maximum time limits.

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

Students awarded an assistantship within the **Ira A. Fulton School of Engineering** are **required to be registered for 12 credit hours**. Audit credit hours do not count toward the 12 credit hours.

Students who obtain an assistantship outside the Ira A. Fulton School of Engineering are required to be enrolled a minimum of 6 credit hours. Audit credit does not count towards the 6 credit hours. Enrollment in continuing registration (IEE 795) does not count toward the 6-hour requirement.

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 remission of tuition 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. In addition, the university pays the individual health insurance premium for those TAs and RAs working 20 hours per week (50 percent FTE). The TA/RA offer does not cover additional fees beyond tuition.

f. Policy for Maintaining Academic Satisfactory Progress

Each semester, the computer science program reviews students' files for satisfactory progress toward completion of the degree. All students who fall in one of the four categories are placed on probation or withdrawn from the program:

- 1) Satisfactory progress;
- 2) Academic probation;
- 3) Progress probation;

4) Withdrawal from the CSE program.

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

2. Academic Probation

A student who has been admitted to a graduate degree program in CIDSE with either regular or provisional admission status, must maintain a semester grade point average (GPA) of 3.0:

1. in all work taken for graduate credit (courses numbered 500 or higher),
2. in the coursework on the student's approved plan of study, and
3. in all coursework taken at ASU (overall GPA) post-baccalaureate.

A student will be placed on academic probation if one or more of the student's semester GPAs listed above falls below 3.0. Students will be notified by mail and e-mail when placed on academic probation.

A student will earn academic good standing by obtaining a semester 3.0 or better in the GPAs listed above by the time the next nine graduate hours are completed. A maximum of two semesters are allowed to complete the nine hours of graduate-level coursework to raise the GPA. Coursework such as research and dissertation registration that are for Z or Y grade cannot be included in these nine hours.

Students will also receive an academic probation notice/letter if one of these pertains to your academics:

- Received a "D" or "E" in a required deficiency course or in a course at the 400 level or above.
- Deficiency GPA below 3.0.

3. **Progress probation** pertains to issues dealing with making progress toward a degree. The following are notices/letters you will receive if one of these pertains to your academics:

- Lack of progress toward completing deficiencies as listed on your admission letter.
- Failure to complete the project portfolio.

4. Withdrawal from the CSE program:

An MCS student may be removed from program for any of the reasons listed below:

1. Cumulative GPA is less than 3.0 for two consecutive semesters. (The student with such a cumulative GPA will be put on probation after the first semester.)
2. The semester GPA is less than 3.0 in the course of two consecutive semesters. (The student is put on probation with such GPA after the first semester.)

3. Failure to complete deficiencies within the time allowed, as determined by the admissions committee.
4. Failure to meet a requirement specified for the MCS degree, including not making satisfactory progress toward the completion of the degree.

A student is recommended for withdrawal from the CSE program if she or he fails to meet the probationary standards placed upon in the semester mentioned in the probationary letter. The student will receive a letter from the computer science program explaining the reasons for the withdrawal. The student will have 5 calendar days from the date of the letter to appeal the decision. The CSE 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 the outlined requirements at 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 is not granted in favor of the student, the graduate program chair, on behalf of the GPC, will recommend to the Dean's Office to withdraw the student from the CSE program. The student will then have the opportunity to appeal to the Ira A. Fulton Schools Standards Committee, which reviews the student's case and makes the final ruling to Associate Dean and the CSE program. If the appeal is not granted in favor of the student, the Dean's Office of Academic and Student Affairs will recommend to the Office of Graduate Education to withdraw the student from the CSE program. Please refer the Office of Graduate Education on policies and procedures or contact the graduate advisor in the CIDSE Advising Center.

g. Filing for Graduation

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

h. 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 schools, as well as the university.

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. In addition, 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 the Office of Student Life, or at <http://graduate.asu.edu/beintheknow>.

i. CSE 584 Internship

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 a number of 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.

CPT is available to both domestic and international students. However, international students must work with the International Students and Scholars Center (ISSC) and submit additional documentation to obtain work authorization. Furthermore, international students must include the CPT course CSE 584 (1 credit hour) as an integral part of their program of study, reflected by their approved iPOS.

Addition of the CPT credit(s) should be done at the initial submission of the student's iPOS. Later additions of CPT courses must be requested and approved at least one full semester (fall, spring, or summer) prior to the proposed start date of the internship. For example, a student planning to do an internship during the summer session should have an approved iPOS with the internship course before the beginning of classes in the preceding spring semester. The internship credit cannot be added to an approved iPOS once all coursework has been completed. Exceptions may be made if the internship is relevant to thesis research.

The CSE program chair will determine the need for a CPT internship in such cases in consultation with the graduate academic advisor. Note that approval of an iPOS with the CSE 584 credit confirms that the internship is an integral part of the degree requirements as planned by the student. Hence, students who are not able to fulfill the internship credit requirements in their iPOS are required to replace the course credit requirements through the following options:

- taking the 1-credit hour CSE 594 seminar course
- taking a 3-credit hour graduate course

In order to be eligible for internship, a student must be in **good academic standing (cumulative, graduate, and iPOS GPA of 3.0 or above) and not have an academic integrity violation** in a course for two full semesters (summer semesters not included) from the initial reporting of the incident. For example, a sanctioned academic integrity violation initially reported on April 15, 2012 will make the student ineligible for this approval until the end of spring 2013 semester.

International students need to be aware of immigration policies and regulations, which may jeopardize their academic status. Hence, it is strongly recommended for international students to consult with the International Students and Scholars Center (ISSC).

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

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 a minimum six (6) credit hours of in-person, on-campus coursework at the ASU Tempe campus. A maximum of three (3) credit hours of online courses is permitted. The CSE 580 practicum course will not count as satisfying the student's "physical presence" at ASU. Students will not be able to take part in internships outside the Phoenix metropolitan area. In some cases students may be approved to do an internship in Tucson or other nearby locations to Phoenix, as long as the student is able to prove they can physically attend their courses on campus.

Required documents and forms for the internship proposal must be submitted to the CIDSE Advising Office at least four weeks prior to the beginning of the semester in which the internship is planned. Students will not be able to request late-add registration of the CSE 584 Internship credit to their class schedule after the add/drop deadline of each semester.

An approved proposal 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 on the CIDSE [CPT website](#). Students must receive approval from their faculty advisor and from the graduate program director before registering for CSE 584. At the M.S. level, internship is intended to enhance the student's research capabilities in the area related to the thesis. Therefore, the internship plan must show the relationship between the work proposed and the intended research program. The faculty advisor may be asked to write a separate letter explaining why the internship is required. In order register for the CSE 584 - Internship, a student must have a **cumulative, graduate, and iPOS GPA of 3.0 or above** and not have an academic integrity violation in a course for two full semesters (summer sessions not included) from the initial reporting of the incident. A final plan of study must be filed with the Office of Graduate Education showing the internship credit before registering for CSE 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

Never accept a job with the intention of turning it down if "something better" comes along. Not only is it inconsiderate and unprofessional, it also reflects badly on Arizona State University and might negatively impact another ASU student's opportunities with that employer. Also, employers communicate with each other and you don't want to get a bad reputation.

After you have given your decision careful consideration and accepted an offer, stop looking. Inform other employers who have extended offers that you have accepted another position. Don't accept further interview invitations or search further. Please refer to NACE's Playing Fair...Your Rights and Responsibilities as a Job Seeker http://www.nacweb.org/playing_fair/ to become familiar with Principles for Professional Practice.

A five-page final report is required at the end of the internship before a grade and credit is given. The final report must be submitted to the reporting supervisor for comments and then to the faculty advisor for grade assignment. Refer to the CIDSE [CPT website](#) for guidelines to prepare the final report.

j. Engineering Student Organizations

There are dozens of engineering student organizations and teams ranging from honors and professional associations to groups creating underwater robots, concrete canoes and launching rockets. Student organizations are excellent opportunities to learn about career possibilities as many of the student groups operate in conjunction with industry professional societies ... get involved today! Please visit <http://studentorgs.engineering.asu.edu/> for a list of Engineering Student Organization.

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, 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 and graders. This diverse higher education delivery platform may differ significantly from the high school experience, and while it provides opportunity to expand the student's ability to learn and develop problem solving skills, concerns and conflicts with requirements and instructors may occasionally arise. CIDSE 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 but at the same time, as an engineering and computer science program, they have a responsibility to ensure standards are maintained and student outcomes are achieved prior to graduation. The university culture recognizes the value of diversity in multiple dimensions as well as the presumption of expertise and academic freedom of the faculty.

Communicate with your Instructor

If you have a difference of opinion with your instructor or teaching assistant (TA), or have concerns about technical or administrative aspects of the course, visit the instructor or TA 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 succinct information about what you are having trouble understanding in the course or your concern. Instructors and TAs are here to help. Please 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, you should be spending three hours studying every week for each hour of course credit. Thus you should schedule 8-10 hours of time each week to devote to each 3-credit course. In addition, 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 deadline of the assignment.

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

Connect with your Graduate Program Chair

If you are unable to resolve the concern after initial contact with the instructor or the TA, and you have met with your academic advisor, you should then connect with the graduate program chair for your degree (or the department offering the course). The graduate program chair will confer with the instructor and/or TA to better understand the concern and try to resolve the problem. Please note that before meeting with the graduate program chair you should have made a reasonable effort to meet with the course instructor (not just the TA) and get the issue resolved. When contacting the graduate program chair, provide all the relevant details such as the course syllabus, assignment handout, email exchange with the instructor, etc. so that the graduate 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 please bring along all the relevant documents.

If the instructional concern is not resolved with the graduate program chair or the department offering the course, contact the Associate Dean of Academic Affairs Office for the college offering the course for assistance.

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 documentations.
- Act proactively and promptly.

In Summary, Guidelines for Avoiding Problems

- Be sure you have the necessary prerequisite knowledge before starting a course;
- Attend class and online exercises regularly;
- Devote time each week to studying to avoid falling 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 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.

List of Approved 500-level Area Courses

Course Prefix	Course Title	Foundations	Systems	Applications
CSE 509	Digital Video Processing			X
CSE 510	Database Management System Implementation			X
CSE 511	Semi-Structured Data Management			X
CSE 512	Distributed Database Systems			X
CSE 515	Multimedia and Web Databases			X
CSE 520	Computer Architecture II		X	
CSE 522	Real-Time Embedded Systems		X	
CSE 530	Embedded Operating Systems Internals		X	
CSE 531	Distributed and Multiprocessor Operating Systems		X	
CSE 534	Advanced Computer Networks		X	
CSE 535	Mobile Computing		X	
CSE 536	Advanced Operating Systems		X	
CSE 539	Applied Cryptography		X	X
CSE 543	Information Assurance and Security		X	
CSE 545	Software Security		X	
CSE 546/591	Cloud Computing		X	
CSE 548	Advanced Computer Network Security		X	
CSE 550	Combinatorial Algorithms and Intractability	X		
CSE 551/591	Foundations of Algorithms*	X		
CSE 552	Randomized and Approximation Algorithms	X		
CSE 555	Theory of Computation	X		
CSE 556	Game Theory with Applications to Networks	X		
CSE 561	Modeling and Simulation Theory and Applications		X	
CSE 563	Software Requirements and Specification		X	
CSE 564	Software Design		X	
CSE 565	Software Verification, Validation and Testing		X	
CSE 566	Software Project, Process and Quality Management		X	
CSE 569	Fundamentals of Statistical Learning and Pattern Recognition	X		
CSE 570	Advanced Computer Graphics I			X
CSE 571	Artificial Intelligence			X
CSE 572	Data Mining			X
CSE 573/591	Semantic Web Mining			X

CSE 574	Planning and Learning Methods in AI			X
CSE 575	Statistical Machine Learning			X
CSE 576	Topics in Natural Language Processing			X
CSE 577	Advanced Geometric Modeling I			X
CSE 578/591	Data Visualization			X
CSE 579	Knowledge Representation and Reasoning	X		

4XX and 4XX/598 courses do not apply toward the required area courses.

* CSE 598 Design and Analysis of Algorithms and CSE 591 Foundations of Algorithms cannot both be listed on the iPOS.

Approved 400-Level courses to count toward CSE graduate program

IMPORTANT: Students who have taken any of the 4XX courses listed below as 598 cannot take the same class at the 400-level.

- CSE 408 Multimedia Information Systems
- CSE 412 Database Management
- CSE 414 Advanced Database Concepts
- CSE 432 Operating System Internals
- CSE 434 Computer Networks
- CSE 438 Embedded Systems Programming
- CSE 440 Compiler Construction I
- CSE 445 Distributed Software Development
- CSE 446 Software Integration and Engineering
- CSE 457 Theory of Formal Languages
- CSE 459 Logic for Computing Scientists
- CSE 460 Software Analysis and Design
- CSE 463 Introduction to Human Computer Interaction
- CSE 464 Software Quality Assurance and Testing
- CSE 465 Information Assurance*
- CSE 466 Computer Systems Security
- CSE 467 Data and Information Security
- CSE 468 Computer Network Security
- CSE 469 Computer and Network Forensics
- CSE 470 Computer Graphics
- CSE 471 Introduction to Artificial Intelligence
- CSE 472 Social Media Mining
- CSE 476 Introduction to Natural Language Processing
- CSE 477 Introduction to Computer-Aided Geometric Design

*Credit is allowed for only CSE 465 or CSE 543 but not both.

A maximum of 6 credit hours of 400-level coursework is allowed. A maximum of 12 hours of a combination of 400-level and cross-listed courses (4XX/5XX) is allowed. If a 400 level course is cross-listed with a 500 level course, students will be required to enroll in the 500 level.

Course Descriptions

CSE 509 Digital Video Processing

Concepts of digital video compression, video analysis, video indexing, browsing and retrieval, video transmission over networks, video processors, and relevant industry standards.

CSE 510 Database Management System Implementation

Implementation of database systems. Data storage, indexing, querying, and retrieval. Query optimization and execution, concurrency control, and transaction management.

CSE 511 Semi-Structured Data Management

Addresses the data management issues for semi-structured data, which are commonly found in Web applications. Covers techniques on modeling, storing, querying and searching data without schemas, with optional confidence, and/or provenance information. Requires knowledge on relational databases and programming skills.

CSE 512 Distributed Database Systems

Distributed database design, query processing, and transaction processing. Distributed database architectures and interoperability. Emerging technology.

CSE 515 Multimedia and Web Databases

Data models for multimedia and Web data; query processing and optimization for inexact retrieval; advanced indexing, clustering, and search techniques.

CSE 520 Computer Architecture II

Computer architecture description languages, computer arithmetic, memory-hierarchy design, parallel, vector, multiprocessors, and input/output.

CSE 522 Real-Time Embedded Systems

Development of real-time embedded systems, scheduling algorithms, embedded software structures, real-time operating system.

CSE 530 Embedded Operating System Internals

Investigating Linux source including: memory management, kernel synchronization and driver design topics. Designing, coding, testing, and evaluating embedded operating system software in a Linux environment.

CSE 531 Distributed and Multiprocessor Operating Systems

Distributed systems architecture, remote file access, message-based systems, object-based systems, client/server paradigms, distributed algorithms, replication and consistency, and multiprocessor operating systems.

CSE 534 Advanced Computer Networks

Advanced network protocols and infrastructure, applications of high-performance networks to distributed systems, high-performance computing and multimedia domains, special features of networks.

CSE 535 Mobile Computing

Mobile networking, mobile information access, adaptive applications, energy-aware systems, location-aware computing, mobile security and privacy.

CSE 536 Advanced Operating Systems

Protection and file systems. Communication, processes, synchronization, naming, fault tolerance, security, data replication, and coherence in distributed systems. Real-time systems.

CSE 539 Applied Cryptography

Uses cryptography for secure protocols over networked systems, including signatures, certificates, timestamps, electrons, digital cash, and other multiparty coordination.

CSE 543 Information Assurance and Security

Comprehensive understanding of information assurance and security problems with the solutions as well as hands-on experiences about applying these solutions.

CSE 545 Software Security

Theories and tools for software security, including secure design, threat analysis and modeling, security testing and coding.

CSE 546 Cloud Computing

Virtualization, cloud computing, programmable networking, performance evaluation, information assurance, distributed and parallel computing, and cloud computing-based applications. Students must have a solid background in computer architecture, operating system and computer networking to be successful in this course.

CSE 548 Advanced Computer Network Security

Comprehensive understanding of network security and corresponding solutions, including cryptography, access control, secure Web transactions, e-mail security, and viruses.

CSE 550 Combinatorial Algorithms and Intractability

Combinatorial algorithms, nondeterministic algorithms, classes P and NP, NP-hard and NP-complete problems, and intractability. Design techniques for fast combinatorial algorithms.

CSE 551 Foundations of Algorithms

Advanced topics in formal algorithm design and analysis, including advanced shortest-paths algorithms, amortized analysis, network flows, NP-completeness and selected topics in computational geometry, distributed/parallel, randomized, and approximation algorithms.

CSE 552 Randomized and Approximation Algorithms

Introduces two important areas of algorithm design for graduate students. A randomized algorithm is allowed to rely on the outcome of a random experiment in deciding on its next step. In many applications, randomized algorithms are simpler than any deterministic algorithms known, but in several cases, they are in fact more powerful or more efficient than any

deterministic algorithms. Covers basic paradigms for randomized algorithm design and analysis, as well as for derandomization.

CSE 555 Theory of Computation

Rigorous treatment of regular languages, context-free languages, Turing machines and decidability, reducibility, and other advanced topics in computability theory.

CSE 556 Game Theory with Applications to Networks

Strategic conflict as matrix games, notions of equilibrium, definition and existence of Nash equilibrium, zero-sum games, extensive-form games, Bayes Nash equilibrium, potential games, routing games, algorithmic game theory, computation of Nash equilibrium, incentives and pricing in communication networks, application of game theory in wireless networks. Knowledge of calculus, discrete mathematics, probability theory and algorithms is necessary to be successful in this course.

CSE 561 Modeling and Simulation Theory and Application

Modeling theories, simulation protocols, object-oriented modeling, model design, simulation analysis, network-based systems, discrete-event modeling, continuous modeling, hybrid modeling.

CSE 563 Software Requirements and Specification

Examines the definitional stage of software development; analysis of specification representations, formal methods, and techniques emphasizing important application issues.

CSE 564 Software Design

Examines software design issues and techniques. Includes a survey of design representations and a comparison of design methods.

CSE 565 Software Verification, Validation, and Testing

Test planning, requirements-based and code-based testing techniques, tools, reliability models, and statistical testing.

CSE 566 Software Project, Process, and Quality Management

Project management, risk management, configuration management, quality management, and simulated project management experiences.

CSE 569 Fundamentals of Statistical Learning and Pattern Recognition

Concepts of statistical pattern recognition, Bayesian decision theory, parameter estimation, discriminant analysis, basics of artificial neural networks, basics of data clustering. Knowledge of college-level calculus, linear algebra, basic probability theory and proficiency in computer programming is necessary to be successful in this course.

CSE 570 Advanced Computer Graphics I

Hidden surface algorithms, lighting models, and shading techniques. User interface design. Animation techniques. Fractals and stochastic models. Raster algorithms.

CSE 571 Artificial Intelligence

Definitions of intelligence, computer problem solving, game playing, pattern recognition, theorem proving, and semantic information processing; evolutionary systems; heuristic programming.

CSE 572 Data Mining

Advanced data mining techniques: classification, clustering, association, preprocessing; performance evaluation; information assurance, Web mining, security and privacy issues, and other applications. Students must have a solid background in database management systems, search, learning, and statistics to be successful in this course.

CSE 573 Semantic Web Mining

Data mining techniques for structuring and organizing unstructured sources such as text and Web data into meaningful machine-processable information; computational aspects of information extraction and data linkage; discovery and prediction tasks where text serves as data such as detecting events, measuring public opinion and making recommendations. A background in databases, algorithms and theory of computation is necessary to be successful in this course.

CSE 574 Planning and Learning Methods in AI

Reasoning about time and action, plan synthesis and execution, improving planning performance, applications to manufacturing intelligent agents.

CSE 575 Statistical Machine Learning

Spectral clustering, regression, classification, semi-supervised learning, feature reduction, manifold learning, ranking, kernel learning and multitask learning.

CSE 576 Topics in Natural Language Processing

Comparative parsing strategies, scoping and reference problems, nonfirst-order logical semantic representations, and discourse structure.

CSE 577 Advanced Geometric Modeling I

Advanced concepts of geometric modeling: rectangular and triangular surfaces, triangle meshes, Voronoi diagrams, discrete and continuous shape measures, volumes and volume visualization. Students must have a solid background in linear algebra, calculus, and basic 3D graphics to be successful in this course

CSE 579 Knowledge Representation and Reasoning

Covers knowledge representation and reasoning algorithms in artificial intelligence, shows how they can be used in practice, and provides an overview of current research trends.

CSE 580 Practicum

Structured practical experience in a professional program, supervised by a practitioner and/or faculty member with whom the student works closely.

CSE 584 Internship

Structured practical experience following a contract or plan, supervised by faculty and practitioners.

CSE 590 Reading and Conference

Independent study in which a student meets regularly with a faculty member to discuss assignments. Course may include such assignments as intensive reading in a specialized area, writing a synthesis of literature on a specified topic, or writing a literature review of a topic.

CSE 591 Seminar

A small class emphasizing discussion, presentations by students, and written research papers.

CSE 594 Conference and Workshop

Topical instruction, usually in compressed format, leading to academic credit. Often offered off campus to groups of professionals.

CSE 595 Continuing Registration

Used in situations where registration is necessary but where credit is not needed. Replaces arbitrary enrollment in reading and conference, research, thesis, dissertation, etc. Used by students when taking comprehensive examinations, defending theses or dissertations, or fulfilling the continuous enrollment requirement in doctoral programs. Credit is not awarded, and no grade is assigned.

CSE 598 Special Topics

Topical courses not offered in regular course rotation--e.g., new courses not in the catalog, courses by visiting faculty, courses on timely topics, highly specialized courses responding to unique student demand.

CSE 599 Thesis

Supervised research focused on preparation of thesis, including literature review, research, data collection and analysis, and writing.

CSE 691 Seminar

A small class emphasizing discussion, presentations by students, and written research papers.

CSE 790 Reading and Conference

Independent study in which a student meets regularly with a faculty member to discuss assignments. Course may include such assignments as intensive reading in a specialized area, writing a synthesis of literature on a specified topic, or writing a literature review of a topic.

CSE 792 Research

Independent study in which a student, under the supervision of a faculty member, conducts research that is expected to lead to a specific project such as a dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.

CSE 795 Continuing Registration

Used in situations where registration is necessary but where credit is not needed. Replaces arbitrary enrollment in reading and conference, research, thesis, dissertation, etc. Used by students when taking comprehensive examinations, defending theses or dissertations, or fulfilling the continuous enrollment requirement in doctoral programs. Credit is not awarded, and no grade is assigned.

CSE 799 Dissertation

Supervised research focused on preparation of dissertation, including literature review, research, data collection and analysis, and writing.