Georgia State University

Department of Computer Science

Graduate Handbook

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1.1. Department Organization

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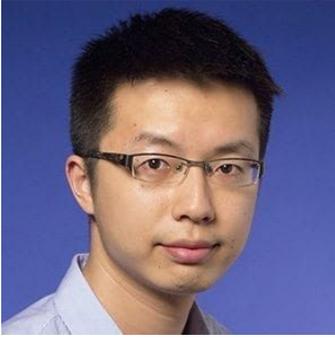
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1.2. Faculty and Staff

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https://www.cs.gsu.edu/role/faculty/
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1.3. Contact Information

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2. Graduate Academic Program

2.1. General Information

The Department of Computer Science offers M.S. and Ph.D. degrees in Computer Science. Both degree programs provide students with advanced training in the fundamental principles and processes of computation. The following concentrations are available:

M.S. in Computer Science

- Computer Science concentration
- Bioinformatics concentration
- Security and Privacy concentration

M.S. in Data Science and Analytics

- Big Data and Machine Learning Concentration

Ph.D. in Computer Science

- Computer Science concentration
- Bioinformatics concentration

Computer Science faculty are actively engaged in a wide variety of research endeavors. Research efforts are concentrated in artificial intelligence and neural nets, bioinformatics, databases, digital image and signal processing, graphics and visualization, networks, parallel and distributed computing, programming languages, simulation and modeling, and software engineering.

2.2. Admissions

Applicants for the M.S. program must satisfy the general requirements of the College of Arts and Sciences (https://cas.gsu.edu/graduate-admissions/) which includes TOEFL

(for non-English speaking International students). The Department of Computer Science has the following additional requirements:

M.S. in Computer Science:

- A baccalaureate degree in computer science, or equivalent. While we welcome capable students with non-computer-science degrees, they may need some foundation courses.
- A supplemental application for Computer Science.
- A statement of background and goals.
- Three letters of recommendation from individuals who can evaluate the applicant's potential for graduate work in computer science.
- GRE (General) score.

M.S. in Data Science and Analytics:

- A strong record of coursework and/or experience in computer science, engineering, mathematics, statistics, natural and physical sciences, or a related discipline (minimum GPA 3.0)
- Experience in programming, data structures and algorithms, linear algebra, and probability and statistics
- Three letters of recommendation
- Statement of purpose (a brief personal essay explaining the applicant's interest in the program, relevant skills and experiences, and career objectives)

Ph.D. in Computer Science:

- A baccalaureate or master's degree in computer science or its equivalent. While we welcome capable students with non-computer science degrees, they may need some foundation courses.
- A supplemental application for computer science.
- A statement of background and goals.
- Three letters of recommendation from individuals who can evaluate the applicant's potential for Ph.D. work in computer science.
- GRE (General) score.
- Minimum GPA 3.0/4.0.

3. General Information

3.1 Class registration and waitlists

Panther Access to Web Services (PAWS, http://paws.gsu.edu/) is a portal for students to conduct most student enrollment processes such as registering for classes, linking to online course work, checking and completing financial aid, paying tuition, etc. Online class registrations can be done from PAWS. Every semester, you will be assigned a time ticket that provides a date and time for when you can begin course registration on PAWS. Priority is given to students who are scheduled to graduate for the upcoming registration term and then to continuing students according to the total credit hours earned, etc. The GSU's official registration guide is available on https://registrar.gsu.edu/registration/registration-guide/.

With the ever growing enrollments, some of our graduate courses are filled quickly. While the department does not have an official policy on waitlists and overflows, some instructors, especially for high demand courses, keep their own waitlists or they may allow overflows if it is feasible. These waitlists are usually first come, first served based on eligibility and merit. If a course is full, you may contact the instructors directly to inquire about waitlists or possible overflows. Note that waitlists are solely at the course instructor's discretion and being on a waitlist does not guarantee a seat, it simply means should a seat become available or if the quota is raised, that the first individual on the waitlist, if eligible, will be given priority to register for that seat.

3.2 Course Transfer

The transfer of graduate courses request forms should be submitted to the department for initial evaluation and then forwarded to the Graduate Services Office for review. You have to submit the following documents:

1) A copy of the course syllabus for each course you want to transfer. If a course syllabus is unavailable, you must obtain satisfactory documentation of the course content from the institution where the course was taken. You must submit copies of course descriptions from course catalogs or websites instead of your own descriptions. A URL may also be given if the material may be currently accessed

from the Internet using the given URL. You may also submit additional supporting materials such as assignments, exams, etc.

2) An official transcript or its copy from your Graduate Admission file. Copies of grade reports are not acceptable.

Fill out the REQUEST FOR TRANSFER OF GRADUATE COURSES form at OGMS. Attach syllabus or course description of each course by uploading a single PDF file. (Note: You must submit copies of course descriptions from course catalogs or websites instead of your own descriptions. A URL may also be given if the material may be currently accessed from the Internet using the given URL. You may also submit additional supporting materials such as assignments, exams, etc.)
Submit a copy of official transcripts and highlight the courses you want to transfer. Email the transcripts as a single PDF file to zyan@gsu.edu with "Credit Transfer Transcript" as the subject title. For Ph.D. students, submit your request after you pass the qualifying exam. For M.S. students, submit your request in your first semester. The submission time window is as follows: **1st week of February (Spring semester) and 1st week of September (Fall semester)**. No application will be accepted outside of the submission time window. Please allow at least 4 weeks for the processing of your request. You can check your results at paws.gsu.edu

The following restrictions and requirements for credit transfer are currently enforced:

All programs:

1) Course work transferred from other institutions is subject to the seven-year time limit on requirements for the master's degree and the ten-year time limit on requirements for the doctorate.
2) All graduate transfer credits must have been earned at an accredited graduate college. All credits requested in transfer must carry a letter grade of "B" or above in graduate-level courses. No "S/F" or "P/F" graded courses may be transferred. Petitions will not be considered for an exemption from this requirement. Please note that transfer credit may impact your GPA.

Master's candidates:

1) A maximum of 6 semester hours of transfer credit may be applied to your degree program. A request for more than six hours must be accompanied by a Petition for Deviation from Graduate Bulletin Regulations, which is available from the

Office of Graduate Studies or at
[thttp://www2cas.gsu.edu/docs/grad/graduate_deviation_petition.doc](http://www2cas.gsu.edu/docs/grad/graduate_deviation_petition.doc) .

Doctoral candidates:

1) A maximum of 30 semester hours of transfer credit may be applied to your degree program.
2) All credits requested cannot be counted as CORE course credits. If the course in a previous institution is considered qualified for credit transfer but the number of credits for that course is not the same as that for GSU's equivalent, the credits will be transferred to CSc 8099. CSc 8099 can **only be counted as elective courses (not CORE or breadth courses)** towards your Ph.D. degree.

Information provided by students for the purpose of obtaining transfer credit is considered as true and accurate. If such information is found to be falsified or inaccurate, it may be grounds for cancellation of enrollment and/or disciplinary action.

3.3 Course Waiver

You have to submit the following documents:

1) The syllabus or course description of each course. You must submit copies of course descriptions from course catalogs or websites instead of your own descriptions. A URL may also be given if the material may be currently accessed from the Internet using the given URL. You may also submit additional supporting materials such as assignments, exams, etc.
2) An official transcript or its copy from your Graduate Admission file. Copies of grade reports are not acceptable.

Fill out the Foundation Course Waiver Form at OGMS. Attach the syllabus or course description of each course by uploading a single PDF file. (*Note: You must submit copies of course descriptions from course catalogs or websites instead of your own descriptions. A URL may also be given if the material may be currently accessed from the Internet using the given URL. You may also submit additional supporting materials such as assignments, exams, etc.*)
Submit a copy of official transcripts and highlight the courses you use for your waiver request. Email the transcripts as a single PDF file to **zyan@gsu.edu** with "Foundation Course Waiver Transcript" as the subject title. The request should be submitted in your first semester. The submission time window is as follows: **1st week of February**

(Spring semester) and 1st week of September (Fall semester). No application will be accepted outside of the submission time window. Please allow at least 4 weeks for the processing of your request. You can check your results in paws.gsu.edu.

The following restrictions and requirements for credit transfer are currently enforced:

1) A waiver request can only be submitted in your first semester since your enrollment at GSU.
2) Courses taken at another institution must have at least a letter grade of "B" or its equivalent

Information provided by students for the purpose of obtaining transfer credit is considered as true and accurate. If such information is found to be falsified or inaccurate, it may be grounds for cancellation of enrollment and/or disciplinary action.

3.5 Student Conduct

The Student Code of Conduct specifies the University's expectations of student behavior and students' rights at the Institute. The code also creates a standard by which students and student organizations are expected to conduct themselves for an environment conducive to academic excellence. Dean of Students Office oversees the administration of the code for both academic and nonacademic misconduct. Please read the entire Student Code of Conduct and other student policies on the Dean of Students Office website https://deanofstudents.gsu.edu/.

3.6 Complains and Conflicts

The stuff is available to help you. If you are a PhD or MS thesis student, this particularly includes if you ever find you are struggling to effectively communicate with your advisor or are experiencing a conflict that you cannot resolve on your own. The staff is available to hear your concerns and advise you on how to find solutions. We can help you determine the best methods to communicate directly with your advisor and/or hold mediated conversations between you and your advisor. We encourage you to reach out to us as soon as you are experiencing a problem so that we may help you reestablish an effective working relationship before the problem escalates. You can trust that we will respect requests for confidentiality, except on issues we are required by law to report, related to sexual harassment and violence.

The Office of Ombudsperson is an impartial entity who strives to see that faculty, staff and students at the university are treated fairly and equitably. Georgia State staff, faculty, and graduate students can seek the advice of the Ombudsperson. The Ombudsperson is impartial, neutral, and confidential. The rights and interests of all parties to disputes are considered, with the goal of achieving fair outcomes. For more information about Ombuds services, please visit: https://ombuds.gsu.edu/

3.7 Office Space
Each registered graduate student will be provided working space in the department. CS students funded by a GTA or GRA in the department will be provided a cubicle space. Specific Ph.D. students will be provided office working space on a case-by-case basis. The space allotments will be decided by the department graduate student committee and the space allotment committee.

3.8 Computers
Each Ph.D. student registered full time in the department will be provided one desktop computer access for work purposes for the duration of their Ph.D. tenure in the department. Upon submission of materials for graduation, the student must duly return all PC materials provided for work purposes back to GSU, failure of which can cause delay or holds in their graduation process.

3.9. GSTEP – Georgia State Test of English Proficiency

Students with TOEFL scores between 80 and 100 or IELTS scores between 6.5 and 7.5 should take the GSTEP during orientation to determine the need for placement in ESL 7250 and/or ESL 7350. The Graduate Programs office will provide support to Applied Linguistics to cover the cost of administration and scoring for these students. Students whose scores fall below 80 on the TOEFL or 6.5 on the IELTS should enroll in both ESL 7250 and 7350. Historically, ~85% of students scoring below 80 (TOEFL) or 6.5 (IELTS) are recommended for these ESL courses subsequent to GSTEP testing.

In the past, GSTEP testing has been made available to any international graduate student, whether their college or department follows through with ESL course recommendations or provides their own language support. Currently, the GSTEP will only be offered to students in colleges that avail themselves of the ESL courses offered by Applied Linguistics.

4 Graduate Student Employment

4.1 GTA/GRA requirements

In order to be hired as a GRA or GTA, you must be a full-time student. Many GRA assignments, however, consist of the same project that you are pursuing as a thesis or dissertation. In this case, you must spend at least the specified number of hours per week (15-20) on the project to fulfill your work obligation. Any hours spent beyond these are considered your educational responsibilities and are under your control.

GTA reporting requirements
GTA must
- meet with the assigned course instructor prior to the start of the first day of the course and discuss duties.
- conduct basic teaching assistant duties such as grading, managing attendance, proctor examinations etc. as specified by the instructor of the course.
- report weekly to the course instructor on updates of their TA duty updates.
- meet with potential faculty who can serve project/thesis mentors. The student is required to be involved in a research project during their tenure as a GTA. As a first time GTA, students can sample each faculty's research group by attending their respective lab/group periodic research meetings.

GRA reporting requirements
- Must meet with the assigned or selected research advisor prior to the start of the first day of the imminent semester and discuss research duties.
- Conduct research as agreed with the research advisor.
- Report periodically to the research advisor on research updates. It is upto the faculty and the student to plan the research path and progress.

GTAs and GRAs will be evaluated semester wise on a department level with recommendations and questionnaires sent to associated faculty. GTAs and GRAs must also maintain a minimum GPA as specified by the GSU graduate school policies -- typically this is around 3.5

4.2 Curricular Practical Training (CPT)

Continuing graduate students with F1 visas can be employed outside GSU with Curricular Practical Training (CPT). CPT is temporary, off-campus employment authorization for F1 visa students. The work must be either required or related to a course in the student's major program of study, and the student must receive academic credits for the work. To be eligible for CPT the graduate students must

- Be enrolled full time for at least one academic year (Fall+Spring) prior to authorization at GSU or at another SEVIS approved institution.
- Have an active F-1 status
- Have good academic standing with the school
- Get an approval from supervising faculty member (i.e., research advisor)

Students do not qualify for CPT application after the completion of their program of study and the work cannot begin without SEVIS notation on your I-20. CPT is employer-specific, which means an offer of employment is required to apply. The application windows and specifics of the employment letter is provided by International Student and Scholar Services and are available at https://isss.gsu.edu/current-students/employment-authorization/f-1-practical-training/curricular-practical-training-cpt/.

5. Master's Degree

5.1. Graduation Requirements

A grade of B must be earned for all courses counting toward Computer Science graduate degrees. Department offers Bioinformatics and Security and Privacy Concentrations as well as the core program. Students in Security and Privacy Concentration are required to complete a project. For the core program and Bioinformatics concentration students can choose among thesis, project, or course only options, which are described in the following sections. Note here that the course only options are not eligible for funding. Also note that the students choosing the project option, must be supervised by a CS faculty advisor, and the projects and associated requirements will need to pass certain quality requirements.

5.1.1 M.S. in Computer Science

1. Foundation coursework: If any of the following foundation courses in Computer Science or Mathematics have not been taken in another program, these must be completed at the earliest. 4000-level foundation courses must be taken as their 6000-level counterparts by graduate students.
   - Foundation coursework in computer science with a grade of B or higher in each.
     - CSC 2510 Theoretical Foundations of Computer Science (3)
     - CSC 2720 Data Structures (3)
     - CSC 3210 Computer Organization and Programming (3) or CSC 4210/CSC 6210 Computer Architecture (4)
     - CSC 4320/CSC 6320 Operating Systems (4)
     - CSC 4330/CSC 6330 Programming Language Concepts (4) or CSC 4340/CSC 6340 Introduction to Compilers (4) or CSC 4510/CSC 6510 Automata (4)
     - CSC 4350/CSC 6350 Software Engineering (4)
     - CSC 4520/CSC 6520 Design and Analysis of Algorithms (4)
   - Foundation coursework in mathematics that includes a standard elementary calculus sequence (MATH 2211 and MATH 2212) with a grade of B or higher in each.
2. CSC 8900 Seminar in Computer Science (1 hour). A research training course which must be taken in the first semester.
3. Graduate-level coursework (24 hours): To be taken in consultation with an academic advisor, and approved by the Director of Graduate Studies, with a grade of B or higher in each course.

- ○ Sixteen hours of computer science courses at the 8000-level, exclusive of Research, Thesis Research, and Independent Study courses.
- ○ An additional eight hours of graduate-level coursework, exclusive of Research, Thesis Research and Independent Study courses.

4. Thesis/Project/Course Only (6-8 hours)
   - ○ Thesis Option: Six hours of Thesis Research (CSC 8999). A thesis committee must be set up no later than two semesters after completing any foundation courses. This work should culminate in the writing of a thesis. The thesis must be defended successfully in an oral examination. This examination will pertain to, but is not limited to, the subject matter of the thesis.
   - ○ Project Option: Four hours of CSC 8930 in which the student completes a project and an additional four hours of graduate-level coursework in computer science at the 6000 level or above exclusive of Foundation Research, Thesis Research, and Independent Study courses. The project must be supervised by a computer science graduate faculty advisor. The student must write a report on the project and pass an oral final examination given by an ad hoc faculty committee headed by the project advisor. This examination will pertain to, but is not limited to, the subject matter of the project.
   - ○ Course Only Option: One credit hour of CSC 8901 in which the student covers the topics in core areas of computer science, recent developments, and future directions. In addition, two additional courses, one at the 6000-level or above in computer science exclusive of Foundation courses, Research, Thesis Research, and Independent Study courses and the other at the 8000-level exclusive of Research, Thesis Research, and Independent Study courses.

5.1.2 M.S. in Computer Science (Bioinformatics Concentration)

1. Foundation Coursework (any that are not done): MATH 2211; MATH 2212; CSC 2510; CSC 2720; CSC 3210 or CSC 4210; CSC 4320; CSC 4330, CSC 4340, or CSC 4510; CSC 4350, and CSC 4520 with B or better in each. 4000-level foundation courses must be taken as their 6000-level counterparts by graduate students.
2. Graduate Coursework (30 hours):
   - ○ Computer Science (16 hours): CSC 6640, CSC 8630 and two other 8000-level classroom taught courses.
   - ○ Biology (8 hours): BIOL 7800 Molecular Cell Biology; BIOL 7810 Molecular Cell Biology Laboratory; and BIOL 7900 Genetics; or BIOL 6564 Advanced Genetics.
   - ○ Chemistry (3 hours): CHEM 6150 Introduction to Biophysical Chemistry. Alternatives to CHEM 6150 include CHEM 6110 or CHEM 6120, or CHEM 6600 or CHEM 8900.
   - ○ Mathematics/Statistics (3 hours): MATH 6544 Biostatistics.
3. Thesis/Project/Course Only (6-8 hours):
   - ○ Thesis Option: Six hours of CSC 8999 Thesis Research. A thesis committee must be set up no later than two semesters after completing any foundation

courses. This work should culminate in the writing of a thesis. The thesis must be defended successfully in an oral examination. This examination will pertain to, but is not limited to, the subject matter of the thesis.

- Project option requires 4 hours of CSC 8930 M.S. Project and an additional classroom taught 6000-level or higher computer science course.
- Course Only Option: One credit hour of CSC 8901 in which the student covers the topics in core areas of computer science, recent developments, and future directions. In addition, two additional courses, one at the 6000-level or above in computer science exclusive of Foundation courses, Research, Thesis Research, and Independent Study courses and the other at the 8000-level exclusive of Research, Thesis Research, and Independent Study courses.

5.1.3 M.S. in Computer Science (Security and Privacy Concentration)

1. Foundation Coursework (any that are not done): MATH 2211, MATH 2212, CSC 2510, CSC 2720,
2. CSC 3210 or CSC 4210, CSC 4320, CSC 4520 with B or better in each. 4000-level foundation courses must be taken as their 6000-level counterparts by graduate students.
3. CSC 8900 Seminar in Computer Science (1). A research training course which must be taken in the first semester.
4. Graduate Required Courses (12 hours):
   - CSC 6222, CSC 6223, and CSC 8224
5. Graduate-level coursework (16 hours): Complete 16 hours of the following courses (at least two at the 8000 level must be included):.
   - [CSC 6224], [CSC 6250], [CSC 6251], [CSC 6360], [CSC 6740], [CSC 6760], CSC 8220, [CSC 8222], [CSC 8223], [CSC 8228], [CSC 8250], [CSC 8251], [CSC 8320], [CSC 8370], [CSC 8350], [CSC 8550], [CSC 8712]
6. Project: Four hours of CSC 8930 M.S. Project. (4 hours)

5.1.4 Dual B.S./M.S. in Computer Science

The department offers a dual Bachelor of Science and Master of Science in Computer Science. The dual degree opportunity enables qualified students to enroll in graduate courses late in their undergraduate program and apply the coursework toward both the bachelor's and master's programs.

Students must be formally accepted into the dual degree program by the department and College of Arts and Sciences to be able to take graduate courses as an undergraduate. Additionally, acceptance into the dual program does not constitute admission to the master's program. Students must fulfill regular graduate admissions requirements and apply for the master's program following college processes.

Information about the dual program, including application instructions and program requirements, can be found at cas.gsu.edu/dual-degrees/.

5.2 Change of Concentration

In order to change the concentration a student should provide a reasonable justification. It may be, for example, a letter from the student's advisor indicating that his/her current project is related to the topic lying outside the current concentration. The justification should be submitted to Associate Director for Graduate Studies.

5.3 Research Advisor Selecting and Changing

5.3.1 Selecting Research Advisor

All new M.S. students who are assigned as graduate assistants (GTA, GRA, or GLA) must find a research advisor and get involved in a research project by the end of the first month of their first semester in the department (whether they select thesis or project options) .

The process of assigning new and/or undesignated M.S. students to research projects and advisors accommodates both student and faculty desires to the maximum extent possible. You are expected to interview at least three faculty members.

By the deadline, submit your choice of advisors (up to three) to the Associate Director of Graduate Studies on the Faculty Advisor Interview form (https://www.cs.gsu.edu/files/2020/02/Advisors-Meeting-Form.docx). Similar feedback is obtained from each faculty member. The Associate Director of Graduate Studies make the final M.S student project-advisor assignments based on:
- Faculty preference
- Student preference
- Project priority (externally-funded projects have the highest priority)
- Current distribution of graduate students among advisors

5.3.2 Changing Research Advisor

If an M.S student wishes to change his/her advisor, s/he must first discuss the matter with his/her current advisor and satisfactorily complete all the graduate research assistant and research obligations and find a new faculty advisor.

Advisor Change request should be submitted before the semester starts. To initiate a Change of Advisor request, please use the online form available at https://www.cs.gsu.edu/files/2020/01/Advisor-Change-Request-form.docx

Fill out the form and submit it to the Director of Graduate Students. The current advisor will be sent an email to approve this request and "release" the student. The current advisor will be

asked to provide feedback on the progress and completion of graduate assistant duties. The new advisor will then be sent an email along with the feedback from the current advisor to approve this request and "accept" the student. Students who fail to conduct and finish their research projects or arbitrarily abandon the assigned projects will not be considered for graduate assistantship duties.

The process of changing advisors is overseen by the Director of Graduate Studies and involves three parties: the student, current advisor, and future advisor. The student is responsible to acknowledge all the other parties and the Director of Graduate Studies during this process. Failure to notify may hinder the student's timely graduation and jeopardize the continuation of graduate assistantship support.

5.4 Tuition Waiver

[SRC: https://ursa.research.gsu.edu/files/2013/03/Graduate-Assistant-Policy.pdf]
Every semester, a number of M.S. students are hired as laboratory, research, and teaching assistants. Full and partial tuition waivers are available. To be considered for graduate assistantships, applicants must submit all application materials by February 15 for Fall semester and by August 15 for Spring semester.
Note: Foreign national students may not exceed 50% full time employment (FTE) appointments and must not work more than 20 hours per week. In order to comply with federal immigration laws, Georgia State University has defined a 20% FTE as 8 hours of work commitment for each week.

To be eligible for full tuition waivers, an M.S. student must meet the following criteria:
- Have an appointment total of at least 20% full time employment
- Meet a full time enrollment minimum (9 credit hours each for fall and spring semesters; 6 credit hours for summer)
- Total earnings of at least the minimum graduate assistant stipend ($2,000 each for fall and spring semesters; $1,000 for summer; or $5,000 per calendar year)
- Minimum stipends can be accomplished through appointments in more than one unit
- Enroll in mandatory health insurance program or provide proof of insurance

To be eligible for partial (50%) tuition waivers, an M.S. student must meet the following criteria:
- Have an appointment total of at least a 20% FTE
- Meet a part-time enrollment minimum (6 credit hours per academic term)
- Earn at least the minimum graduate assistant stipend of $1,000 per fall and/or spring semester or $2,500 per calendar year or $500 in summer session

5.5 8900/9900 course

All students are obligated to take and pass CSC8900 course/seminar. The objective of this course is to introduce the students to a variety of issues related to the successful completion of the thesis/dissertation component of the program including selecting a faculty advisor and a research topic, literature searching tools, technical writing and documentation, ethics in writing, and technical presentation. It is also a forum to introduce faculty to new students. To pass the course the students have to participate in seminars with CSC faculty, meet with at least 2 potential advisors to discuss possible project topics, successfully complete quizzes on Responsible Conduct in Research   ) with a score of at least 80% on each quiz module.

6. PhD Degree

6.1 Graduation Requirements

A grade of B must be earned in all courses counting toward Computer Science graduate degrees. Students enrolled in the Ph.D program must maintain a minimum GPA of 3.5 GPA in their coursework at Georgia State University.

6.1.1 Ph.D. in Computer Science

1. Foundation Coursework. If any of the following foundation courses in computer science or mathematics has not been taken in another program, these must be completed at the earliest. 4000-level foundation courses must be taken as their 6000-level counterparts by graduate students.
   - Foundation coursework in computer science with a grade of B or higher in each.
     - CSC 2510 Theoretical Foundations of Computer Science (3)
     - CSC 2720 Data Structures (3)
     - CSC 3210 Computer Organization and Programming (3) or CSC 4210/CSC 6210 Computer Architecture (4)
     - CSC 4320/CSC 6320 Operating Systems (4)
     - CSC 4330/CSC 6330 Programming Language Concepts (4) or CSC 4340/CSC 6340 Introduction to Compilers (4) or CSC 4510/CSC 6510 Automata (4)
     - CSC 4350/CSC 6350 Software Engineering (4)
     - CSC 4520/CSC 6520 Design and Analysis of Algorithms (4)
   - Foundation coursework mathematics that includes a standard elementary calculus sequence (MATH 2211 and MATH 2212) with a grade of B or higher in each.
2. Ph.D. Coursework (48 hours)
   Of these 48 hours, no more than 12 hours can be taken at the 6000 level. These 12 hours exclude any of the foundation courses previously listed.
   - CSC 9900 Seminar in Computer Science (1 hour). A research training course which must be taken in the first semester.
   - Core Coursework (12 hours). Take three courses from the following two groups, at least one from each of the following two groups:
     - Theories: CSC 8520, CSC 8530, CSC 8550, CSC 8560, CSC 8850
     - Systems: CSC 8210, CSC 8220, CSC 8223, CSC 8320, CSC 8321
   - Breadth Coursework (12 hours). Take one each from three of the following groups:

- ■ Artificial Intelligence: CSC 8810, CSC 8851, CSC 8852
- ■ Bioinformatics: CSC 8050, CSC 8540, CSC 8630
- ■ Database: CSC 8710, CSC 8711, CSC 8712, CSC 8713
- ■ Data Mining: CSC 8740, CSC 8741, CSC 8742
- ■ Graphics and Visual Computing: CSC 8260, CSC 8720, CSC 8820, [8830]
- ■ Networks: CSC 8221, CSC 8222, CSC 8250
- ■ Numerical and Scientific Computing: CSC 8270, CSC 8610, CSC 8620
- ■ Software Engineering and Simulation/Modeling: CSC 8350, CSC 8840
- ■ Security and Privacy: CSC 8222, CSC 8224, CSC 8228, CSC 8370
  - ○ Electives (23 hours).
    - ■ To be chosen in concert with dissertation committee and approved by the dissertation committee and should reflect student interest, coursework related to research area, etc.
    - ■ A maximum of 12 credits from 6000-level.
    - ■ A maximum of 8 hours can be directed study/research or seminars: CSC 8950 and CSC 8910.
    - ■ A minimum of 3 hours and a maximum of 9 hours from outside the department.
    - ■ 6 to 20 hours of depth computer science classroom taught non-foundation courses.
3. Qualifying Process. The qualification process consists of two parts:
   - ○ Curriculum Requirement: The student is required to complete three courses in two core areas (Theories and Systems) and receive at least two A grades and one B grade in these courses to meet the curriculum requirement of the qualifying process.
   - ○ Research Examination: The objective of the research examination is to assess the student's potential to begin doctoral-level research. The examination will assess the student's abilities to:
     - ■ Read and understand research papers in their field.
     - ■ Formulate a problem clearly and provide the motivation and requirements for a solution.
     - ■ Determine if a solution is correct.
     - ■ Assess to what extent a presumably correct solution solves the problem.
     - ■ Clearly identify potential next research problems and provide solutions.
     - ■ Communicate effectively, both in writing and orally.
     - ■ Answer questions related to the problem and its solutions.
     - ■ The student will request the research examination in an area/sub-area of computer science. A committee of 3 faculty members will choose two advanced research papers and assign them to the student. After a period of time, the student will present a written report and schedule an oral defense in which there will be general questioning by the committee. The

result of the exam is PASS/FAIL. A student who receives a FAIL in the first attempt will be given a second and final attempt.
- ○ Timeline: A typical student (one who is admitted to the Ph.D. program with very few foundation courses to take) is expected to qualify by the end of the third semester (excluding summers) after admission.
4. Dissertation Committee. Must be formed immediately after completing the qualification process.
   - ○ Major advisor plus at least three other members.
   - ○ One member must be from outside the department. Major advisor and at least two other members must be computer science graduate faculty.
   - ○ This committee should be consulted to plan electives and possibly required courses to ensure depth in the research area.
   - ○ This committee may suggest additional technical writing, mathematics, or computer skill courses depending on the student's background.
5. Candidacy Examination. To be taken within two years of qualifying. A written proposal on the research to be carried out will be submitted and defended in front of the dissertation committee. Upon successful completion of the candidacy examination, a student is declared a candidate for the doctoral degree. An unsuccessful result in the candidacy examination would require the student to take the candidacy examination a second and last time within three semesters (excluding summer).
6. Dissertation (24 hours of CSC 9999).
7. Written dissertation and oral defense.

6.1.2 Ph.D. in Computer Science (Bioinformatics Concentration)

1. Foundation Coursework. If any of the following foundation courses in computer science or mathematics has not been taken in another program, these must be completed at the earliest. 4000-level foundation courses must be taken as their 6000-level counterparts by graduate students.
   - ○ Foundation coursework in computer science with a grade of B or higher in each.
     - ■ CSC 2510 Theoretical Foundations of Computer Science (3)
     - ■ CSC 2720 Data Structures (3)
     - ■ CSC 3210 Computer Organization (3) or CSC 4210/CSC 6210 Computer Architecture (4)
     - ■ CSC 4320/CSC 6320 Operating Systems (4)
     - ■ CSC 4330/CSC 6330 Programming Language Concepts (4) or CSC 4340/CSC 6340 Introduction to Compilers (4) or CSC 4510/CSC 6510 Automata (4)
     - ■ CSC 4350/CSC 6350 Software Engineering (4)
     - ■ CSC 4520/CSC 6520 Design and Analysis of Algorithms (4)
   - ○ Foundation coursework mathematics that includes a standard elementary calculus sequence (MATH 2211 and MATH 2212) with a grade of B or higher in each.

2. Ph.D. Coursework (48 hours)
    ○ CSC 9900 Seminar in Computer Science (1). A research training course which must be taken in the first semester.
    ○ Core Coursework (12 hours). Take three courses from the following two groups, with at least one from each group:
        ■ Theories: CSC 8520, CSC 8530, CSC 8550, CSC 8560, CSC 8850
        ■ Systems: CSC 8210, CSC 8220, CSC 8223, CSC 8320, CSC 8321
    ○ Boinformatics (12 hours): Take CSC 6640 and two from CSC 8050, CSC 8540, or CSC 8630.
    ○ Electives (23 hours). Must include the following:
        ■ Biology (8 hours): BIOL 7800 Molecular Cell Biology, BIOL 7810 Molecular Cell Biology Laboratory, and BIOL 7900 Genetics or BIOL 6564 Advanced Genetics
        ■ Chemistry (3 hours): CHEM 6150 Introduction to Biophysical Chemistry. Alternatives to CHEM 6150 include CHEM 6110, CHEM 6120, CHEM 6660, or CHEM 8900;
        ■ Math/Stat (3 hours): MATH 6544 Biostatistics
        ■ May include a maximum of 5 credits of independent research or seminars (CSC 8950 or CSC 8910).
3. Qualifying Process: same as in regular Ph.D. requirements.
4. Dissertation Committee: same as in regular Ph.D. requirements except one member must be a biologist or chemist.
5. Candidacy Examination: same as in regular Ph.D. requirements.
6. Dissertation (24 hours of CSC 9999): Research should involve a current topic in bioinformatics.
7. Written Dissertation and Oral Defense.

6.2 8900/9900 course

All students are obliged to take and pass CSC9900 course/seminar. The objective of this course is to introduce the students to a variety of issues related to the successful completion of the thesis/dissertation component of the program including selecting a faculty advisor and a research topic, literature searching tools, technical writing and documentation, ethics in writing, and technical presentation. It is also a forum to introduce faculty to new students. To pass the course the students have to participate in seminars with CSC faculty, meet with at least 2 potential advisors to discuss possible project topics, successfully complete quizzes on Responsible Conduct in Research with at least 80% of point for each quiz module.

6.3 Annual Review

Students are supervised by their research advisors throughout the course of their PhD training. The student's performance over an academic year is evaluated by his/her advisor based on the following criteria:

1) Past year GPA
2) Degree milestones completed in the past year (PhD qualifier, Dissertation proposal)
3) Publications and conference presentations
4) Teaching effectiveness (if applicable)

The advisor rates the student's research and service using a score scaled from 1 (Poor) to 4 (Excellent). The graduate directors in consultation with the faculty set the criteria for these scores.

6.4 PhD Qualifier

At the beginning of the second year of their graduate study, students are contacted to take a Qualifying Examination in the areas related to their research areas. The qualification process consists of two parts:

1) Curriculum Requirement. The student is required to complete three courses in two core areas (Theories and Systems) and receive at least two A grades and one B grade in these courses to meet the curriculum requirement of the qualifying process. Timeline: A typical student (one who is admitted to the Ph.D. program with very few foundation courses to take) is expected to qualify by the end of the third semester (excluding summers) after admission.

2) Research Examination. The objective of the research examination is to assess the student's potential to begin doctoral-level research. The examination will assess the student's abilities to read and understand research papers in their field; formulate a problem clearly and provide the motivation and requirements for a solution; determine if a solution is correct; assess to what extent a presumably correct solution solves the problem; clearly identify potential next research problems and provide solutions; communicate effectively both in writing and orally; and answer questions related to the problem and its solutions.

The student will request the research examination in one of the following areas of Computer Science: Artificial Intelligence, Bioinformatics and Computational Biology, Database and Data Mining, Graphics and Visual Computing, Networks and Distributed

Systems, Numerical and Scientific Computing, Security and Privacy, Software Engineering, and Theoretical Foundations.

A committee of 3 faculty members will choose 2 research papers and assign to the student. The chosen papers are preferably to be published in the recent 4 years in top-tier journals such as ACM/IEEE Transactions related to the subject area. Paper 1 is the key paper. Paper 2 should be related to Paper 1. Paper 2 could be from flagship conferences, but not necessary to be published in the recent 4 years.

The student has at least 2 months to prepare a paper review written report. An oral defense will be scheduled, in which there will be general questioning by the committee. The written report needs to be submitted to the committee at least one week prior to the oral defense.

The result of the research exam is PASS/FAIL. A student who receives a FAIL in the first attempt will be given a second and final attempt. In the second attempt, at least 1 new committee member will replace a committee member in the first attempt, and the student's advisor's performance evaluation of the student will be considered.

Suggestions for paper review report:

1. The length of the report should be 3-10 pages. The report must be sent to the committee at least 1 week prior to the presentation.

2. The report should provide the following information:

   A. For each of the 2 papers, provide the summary of the paper (1 paragraph); key contributions of the paper (1 paragraph/bullet points); brief introduction of the methods and approaches, summary of the evaluation results (1 paragraph/bullet points).
   B. Relationship between the two papers in terms of background knowledge, motivation, goals, contributions, performances, etc.
   C. Derive your own observations and explanations for the proposed solutions and experiment/simulation results in the papers.
   D. Identify shortcomings and future research directions considering the computer science context of the papers.

The slides from the qualifier boot-camp conducted by a faculty in CS at GSU can be found here for your reference:

https://docs.google.com/presentation/d/15EOIzlKNogp9wGhBEzoVAHiZKou-GYjA8h0g
DEN-1rs/edit?usp=sharing

6.5 Research Advisor Selection and Change

All new GRA's and GTA's must participate in the thesis advisor selection process during their first semester at GSU. The process for assigning new, undesignated GRA's to research projects and advisors accommodates both student and faculty desires to the maximum extent possible. You are expected to interview three faculty members. By the deadline, submit your top three projects and advisor choices to the Associate Chair for Graduate Studies on the Faculty Advisor Interview form. Similar feedback will be obtained from each faculty member.

The Chair and the Associate Chair for Graduate Studies make the final GRA/GTA project-advisor assignments based on:
● Student preference
● Faculty preference
● Project priority (externally-funded projects have the highest priority)
● Current distribution of graduate students among advisors

6.5.1 Changing Your Faculty Advisor

If a Ph.D. student wishes to change his/her advisor, s/he must first discuss the matter with his/her current advisor and satisfactorily complete all the graduate research assistant and research obligations and find a new faculty advisor.

Advisor Change request should be submitted before the semester starts. To initiate a Change of Advisor request, please use the online form
https://www.cs.gsu.edu/files/2020/01/Advisor-Change-Request-form.docx :
Fill out the form and submit it to the Director of Graduate Students. The current advisor will be sent an email to approve this request and "release" the student. The current advisor will be asked to provide feedback on the progress and completion of graduate assistant duties. The new advisor will then be sent an email along with the feedback from the current advisor to approve this request and "accept" the student. Students who fail to conduct and finish their research projects or arbitrarily abandon the assigned projects will not be considered for graduate assistantship duties.

The process of changing advisors is overseen by the Director of Graduate Studies and involves three parties: the student, current advisor, and future advisor. The student is

responsible to acknowledge all the other parties and the Director of Graduate Studies during this process. Failure to notify may hinder the student's timely graduation and jeopardize the continuation of graduate assistantship support.

6.6 Travel and conferences

There is no specific budget for student travel to conferences or for professional work. Student travel is often funded by their research advisors for travel to conferences, conducting experimental work and other research and professional development related travel. Travel grant for students may be handled in partial by the department in very rare and specific cases as they arise and is up to the purview of the department chair. It is important that the travel is authorized by the supporting faculty and the department chair.

Deadlines for submission of forms (strict):
- Travel authorization (BEFORE TRAVEL) - AT LEAST one month before
- Travel expenses (AFTER LAST DAY OF TRAVEL) - AT MOST 30 days after
- Conference Registration: AT MOST 30 days after PURCHASE of registration.

For travel forms please contact your advisor and/or Celena Pittman (cpittman@gsu.edu) in the Department of CS at GSU.

6.6. Funding

Funding for PhD students could come from the department or from their advisors. The department funding is limited to 5 years and is given only for students who are making good progress in their research. In case of the poor research performance the funding may be terminated earlier.

6.7. Obtaining MS degree Along the Way

PhD students can obtain an MS degree while doing their PhD. In order to qualify for the MS degree, PhD student must have

- passed the qualifier
- published one paper in conference or journal as first author
- completed 7 courses (at least 4 of them at 8000-level)
- must have completed CSc 9900

Students must apply on paws.gsu.edu for graduation with MS. We substitute 4 credits of CSc 8981 for CSc 8930.

7. University Policies and Resources

7.1. Student Center

The Student Center houses numerous offices and programs that promote student growth and development, enhance academic success and foster involvement in the university community.

These student resources also help students navigate university services, learn new skills and deal with the practicalities of campus life.

Office	Location
Black Student Achievement	Student Center East, Suite 300
Civic Engagement	Student Center East, Suite 304
Dean of Students	Student Center East, Suite 303
Disability Services	Student Center East, Suite 205
Student Affairs	
Administration	Student Center East, Suite 301
Creative Services	Student Center East, Suite 211
Greek Life	Student Center West, Suite 475
New Student Orientation	Student Center East, Suite 304
Leadership Development	Student Center West, Suite 475
Multicultural Center	Student Center East, Suite 206
PantherDining	Student Center West, Suite 358

PantherDining Catering	Student Center East, Suite 318
Parent Relations	Student Center East, Suite 304
Religious Life	Student Center West, Suite 469
Student Center Administrative Office	Student Center East, Suite 310
Student Organizations	Student Center West, Suite 475
University Career Services	Student Center West, Suite 270

7.2. Web resources

- PAWS: https://paws.gsu.edu/
  Register for classes, pay tuition, view financial aid information, and view information about your current status at the university.
- iCollege: https://icollege.gsu.edu/
  Access online course materials.
- Student Email System:
  https://technology.gsu.edu/technology-services/it-services/email-and-file-storage/panthermail/
  View student email.
- Housing: https://myhousing.gsu.edu/
  Explore Housing Options.
- Student Health Insurance: https://studentcenter.uhcsr.com/school-page
  Access Student Health Insurance.
- Registration Guides: https://registrar.gsu.edu/registration/registration-guide/
  View registration, fees and final exam information.
- Schedule of Classes:
  https://registration.gosolar.gsu.edu/StudentRegistrationSsb/ssb/term/termSelection?mode=search
  View schedule of classes.
- Course Catalogs: https://enrollment.gsu.edu/catalogs/
  View graduate catalogs.
- Final Exam Schedule:
  https://registrar.gsu.edu/registration/semester-calendars-exam-schedules/
  View final exam schedule.