

**GRADUATE STUDENT HANDBOOK
2014-2015**



SCHOOL OF COMPUTING

**McAdams Hall
Clemson University
Clemson, SC 29634
864-656-3444
Fax: 864-656-0145**

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INTRODUCTION

Welcome/Purpose of this Handbook

Welcome to the School of Computing (SOC) at Clemson University. We wish you success at every stage of your academic journey.

This handbook is intended to familiarize you, as a graduate student in the School of Computing, with the requirements, policies, and procedures involved throughout your graduate experience. The rules and regulations provided in this handbook govern our academic programs and describe the duties and responsibilities of graduate students in the school. These rules and regulations, developed through the years and in conjunction with the Graduate School, have proven to be beneficial for both students and faculty in the school. In addition, this handbook provides useful information and resources to ease and enhance your experience in the program. Each student is expected to be familiar with the contents of this handbook.

These rules and requirements are in addition to and subordinate to those described in the *Graduate School Announcements*, which you can find at www.registrar.clemson.edu/html/catalogGrad.htm or through the Graduate School office in E-108 Martin Hall. Any inconsistencies within this handbook or between this handbook and the *Graduate School Announcements* should be brought to the attention of the Director of Graduate Affairs.

Contact Information

Director of Graduate Affairs: Dr. Andrew Duchowski
andrewd@cs.clemson.edu
309 McAdams Hall
864-656-7677

The Director of Graduate affairs promotes the program, orchestrates recruiting activities, and makes recommendations regarding graduate admissions and teaching assistantship offers. The Director of Graduate Affairs also oversees the regulations and procedures of the program, coordinates curriculum updates, and interacts with the Graduate School on matters such as student status, assistantships, and fellowships. The Director of Graduate Affairs is your first contact should any issue arise regarding your academic progress or the program curriculum.

Student Services Graduate Program Coordinator: Ms. Dee Brown
jimmi2@clemson.edu
107 McAdams Hall
864-656-5853

The Student Services Graduate Program Coordinator is the primary contact person for all graduate student needs. She is responsible for, but not limited to:

- Assisting graduate students with the processing of graduate forms
- Managing student files
- School publications
- Assisting with Association for Computing Machinery (ACM)
- Assisting Upsilon Pi Epsilon (UPE) Honor Society
- Co-advisor to School of Computing Alliance (SoCA)
- Liaison between the Graduate School, Enrolled Services, and the Office of International Affairs (OIA)
- Reporting to the Graduate School students eligible for tuition waivers each semester

- Scheduling the SPEAK Test for international students who have been offered teaching assistantships but have not taken the TSE

For a complete listing of faculty and staff, see Appendix B.

ENTERING THE PROGRAM

Admission Requirements

The minimum requirements to be considered for admission to graduate study in the School of Computing generally follow those of the Graduate School (see the *Graduate School Announcements* at www.registrar.clemson.edu/html/catalogGrad.htm). Minimum requirements include at least a four-year bachelor's degree from an institution whose scholastic rating is satisfactory to the University and a high quality previous academic record. Applicants lacking significant computer science background should contact the Director of Graduate Affairs prior to initiating an application. Satisfactory scores on the general portion of the Graduate Record Exam (GRE) are required. Average scores of the two objective sections (verbal and quantitative) of the Graduate Record Examination (GRE) for students enrolled in the Computer Science M.S. and Ph.D. programs at Clemson are above 150 and 155, respectively. Any applicant with a V+Q total below a combined 305 must be able to submit exceptional supporting materials (transcript, reference letters, etc.) to have a competitive application. For financial support, the GRE V+Q total should normally well exceed 305. The GRE subject test in Computer Science is neither required nor recommended for admission except in certain cases in which the applicant lacks a significant formal background in Computer Science.

Admission to the School of Computing graduate degree programs is restricted to applicants whose academic record indicates a high potential to be successful in graduate studies. This determination is made by the faculty of the School of Computing and is affirmed by the Graduate School. The various indicators used to arrive at this determination may include, but are not limited to: previous academic performance, letters of recommendation, standardized test scores, personal interviews and statements of interest. In reviewing transcripts, both the difficulty of the courses taken and the grade point ratio are considered.

Admission to graduate studies in the School of Computing begins with your submission of an official application to the Clemson University Graduate School via their website at www.grad.clemson.edu/Admission/.

Upon receipt of all admission materials, the Graduate School will forward your application to the School of Computing and the Director of Graduate Affairs for review. Applicants must meet all admission requirements of the Graduate School and the School of Computing before official acceptance will be granted.

Acceptance categories

Students are accepted into the program with either full or conditional status, which indicates the level of performance and completeness regarding the admission criteria.

Full Status: Your credentials equal or exceed every minimum admission criterion prescribed for the applied-for degree.

Conditional Status: At least one piece of required application materials has not been received by the Graduate School. Notice of conditional acceptance may be given prior to receipt of a missing item, but any and all missing materials must be received prior to or during your first semester of enrollment. Upon receipt, you may be admitted to full status. Conditional status may also be granted to highly qualified applicants prior to receipt of the degree they are currently pursuing; however, all requirements for that degree must be completed prior to enrolling in the proposed graduate program at Clemson.

Prerequisites

A successful applicant should have successfully completed courses in: data structures; computer organization; algorithms or theory of computation; operating systems; and programming systems or compilers. If one or two courses are missing in an applicant's background, they may be taken in the first semester.

If course deficiencies are specified as a condition of your admission, it is important that you take the necessary courses early in your program in order to provide you with background for graduate-level courses. Normally, you remove these deficiencies by taking and passing the required courses during a regularly scheduled course offering. These courses do not count toward the total number of semester hours of graduate credit required for graduation.

English language proficiency for teaching assistants

A graduate student whose native language is not English is required by South Carolina state law to pass an English speaking exam (the SPEAK test) before he/she can be certified to teach as a laboratory teaching assistant. The Clemson English department administers the exam, which is similar in form to the Test of Spoken English (TSE) administered by ETS. The exam is offered at the start of each semester and once in the summer, and students may take the exam anytime that it is offered. It is expected that you will pass this exam sometime during your first year of study. If you do not pass the exam by the end of the first year of study, you may be asked to leave the program.

When you do pass the English speaking exam, you will be eligible to serve as a teaching assistant. If you do not receive SPEAK scores before the beginning of your first semester as a teaching assistant, a School of Computing subcommittee will evaluate your speaking abilities for temporary assignment of laboratory teaching assistant duties your first semester; however, you will still be required to take and pass the university's SPEAK test.

Transfer credits

University policy does not allow automatic transfer of graduate credit. Students with graduate credit earned at another institution, or earned before admission to this program must have prior work evaluated for transfer credit. Requests for transfer credit to the program must be recommended by your Advisory Committee and approved by the Director of Graduate Affairs, the School Director, and the Dean of the Graduate School. You should make your request for each course or credited activity to be transferred at the time of filling your GS-2 (Plan of Study). Your request must be accompanied by an official transcript, catalog description, and syllabus or other supporting documentation. Grades earned for courses taken at institutions other than Clemson University will not be included in your grade point average. All transfer credits must be verified by an official transcript from the institution at which the work was completed. It is your responsibility, not your Major Advisor's nor the School of Computing's, to request that an official transcript be sent directly to the Graduate School.

In any case, the number of credit hours that may be transferred from an accredited institution cannot be greater than six semester credit hours for the M.S. degree except for a special program with the University of Science and Technology in China (USTC). For the doctoral degree, no coursework can be transferred to fulfill the minimum 12 credit hours. However, up to two courses taken elsewhere can be used to fulfill the requirements of the Ph.D. Portfolio core competencies within the School of Computing. See the section on the Ph.D. Comprehensive Exam.

Transfer credit will not be awarded for research, internships, courses graded pass/fail, or coursework in which you received a grade lower than a B or its equivalent. No credit will be given for continuing education units, correspondence, extension or in-service courses, or for concentrated courses and workshops that award credits at a rate exceeding one credit per week. Coursework completed outside the six-year time limit may not be transferred to Clemson University or validated for graduate credit. See the *Graduate School Announcements* for more information regarding transfer credits (www.registrar.clemson.edu/html/catalogGrad.htm).

Direct admission to the doctoral program

If you have a bachelor's degree in Computer Science, but not a master's degree, you may apply directly to the Ph.D. program. If accepted directly into the Ph.D. program, you will have to satisfy at least eighteen (18) credit hours of coursework in addition to the twelve (12) credit hours of coursework normally required for the Ph.D. degree. You may receive a one year delay in all deadlines associated with the Ph.D. comprehensive examinations. (Note that there are additional research and seminar credit hour requirements such that the Ph.D. degree is at least 60 credit hours beyond the bachelors.)

If you are enrolled in the master's program, you may be accepted directly into the Ph.D. program prior to completion of your master's degree with the consent of your Major Advisor and Director of Graduate Affairs.

Duplication of degrees

The holder of a master's degree in a given field, received at another institution, may not become a candidate for another master's degree in the same field at Clemson.

Combined Bachelor's/Master's

A combined Bachelor's degree in Computer Science and Master's degree in Computer Science is available. The complete Bachelor's/Master's process will typically take five and a half years. The School of Computing currently allows up to nine (9) credit hours to double count between the two degree programs.

To qualify for the combined Bachelor's/Master's in Computer Science you should have a minimum of 3.4 GPA and 90 credit hours. You should express your interest to the Director of Graduate Affairs during the spring semester of your junior year.

You must apply for admission to the Graduate School by completing Form GS6BSMS (www.grad.clemson.edu/forms/GeneralForms.php), including obtaining all required signatures. The GS6BSMS requires identifying up to 9 credit hours of graduate coursework that will replace bachelor's degree requirements. Upon acceptance, you will receive conditional admission, dependent on your successful completion of your undergraduate degree, your GPA, and your credit hours.

South Carolina residency

Many students are interested in establishing residency in South Carolina for the purpose of paying in-state tuition. The South Carolina residency laws call for you to establish legal ties with the state; you must generally wait one year before establishing legal ties. Thus, you should take steps near the beginning of your program to initiate the process of becoming a South Carolina resident.

The legislation defining residency sets forth a fairly strict set of criteria for the administrative approval of residency requests. The Office of Residency Classification handles all the information regarding domicile requirements for residency status. Due to the frequency of changes implemented by the state legislature in past years, those criteria are not elaborated here. If you are interested in establishing South Carolina residency, review the up-to-date information at www.clemson.edu/financial-aid/residency/requirements.html. Questions should be addressed to the Office of Residency Classification (G-01 Sikes Hall, (864) 656-2281).

University employee enrollment

Since qualified University employees, with the approval of the appropriate Dean or Director, are allowed to enroll in graduate coursework for credit, this section is for you. No member of the faculty or staff who has a rank higher than instructor or its equivalent may be considered as a candidate for an advanced degree in the academic department where you are employed. Payment of the application fee is required.

Limitations on the number of credit hours taken per semester are explained under “[Maximum Enrollment](#)”. You must make up any time spent in class during normal working hours under a schedule acceptable to your employment supervisor. Flexibility will be given to accommodate class schedules, but you must work out conflicts with your supervisor. You must complete a master’s degree within six (6) years of commencing the program; the Ph.D. must be completed within five (5) years of satisfactory completion of your comprehensive examinations.

Registration

Prior to registration for your first semester of study, you must report to the Director of Graduate Affairs. He/she will help you plan your initial program of study.

Registration is conducted entirely online via iROAR. The Office of Registration Services provides a wealth of information that you may refer to regarding the steps to be taken in the registration process at <http://www.clemson.edu/iroar/students/registration/trainingManuals.html>. See the Registration Services website at www.registrar.clemson.edu/portal/. If you have any further questions, please contact the Director of Graduate Affairs.

Any student pursuing any phase of a graduate program must be registered. You should enroll for no more than three Computer Science graduate courses in your first semester. If you are unsure about which three courses you wish to take, you should enroll in at most three and then sit in on any additional courses for the first meeting or two and then try to drop/add if you decide to change courses.

If you have a graduate assistantship, see “[Maximum/minimum credit loads](#)” under Assistantships/Financial Support for enrollment limits.

Orientation

All graduate students are required to access the Graduate School orientation information online at www.grad.clemson.edu/Newlyacceptedstudents.php. The School of Computing also provides an orientation at the start of each fall and spring semester which you must attend. The date, time, and location of the orientations will be provided with the admissions letter from the School.

International Students

Financial certification

International students must certify access to a minimum of one year's estimated expenses. See www.clemson.edu/administration/ia/services/forms.html for more details, or contact the Office International Affairs (OIA) (E-307 Martin Hall, (864) 656-3614).

Student visa

You are responsible for maintaining legal status with the US Department of Homeland Security during your studies. Form DS-2019 (J-1 exchange visitor visa certificate) is usually issued to students who are funded by their home government or by an international organization. If no organizational sponsor is involved, a Form I-20 (F-1 student visa certificate) is issued.

Social Security number

You must be in the country for ten (10) business days before you can apply for a social security number.

If you are an international student receiving an assistantship, you must have your offer letter with you, upon arrival. You must first check in with the OIA, which is located at E-307 Martin Hall. Be sure to bring the following:

- U.S. Visa
- Unexpired foreign passport
- I94
- IAP-66/I-20

It is important to note that you are required to be in the country for ten (10) business days before you can apply for your Social Security Number (SSN) and that you will not be able to begin work until you receive your SSN. In the meantime, you can proceed to the office of the payroll clerk who will complete the necessary paperwork to assist you with getting on the payroll. The payroll clerk will also complete your Employment Verification (EV) form for you, the student, to take to the Social Security Administration (SSA) office. You should then go to the SSA in Anderson, S.C., for a SSN or meet with the SSA representative in Martin Hall on the dates indicated by the OIA.

You *must* have an appointment before going to the Director, International Employment and Tax Info (IETI) office. The telephone number is (864) 656-5589.

Costs

For current tuition and fees, see www.grad.clemson.edu/programs/tuition.php.

Graduate assistants may choose to defer tuition and fees. This is accomplished easily on the day of registration. Persons in the fee assessment area will have a list of all graduate assistants. Anyone listed may sign a note to defer these costs, and these costs will be deducted from the first six (6) full paychecks of the semester.

For more information about academic costs, financial aid and making payments, contact the Office of Student Financial Aid (OSFA) (G-01 Sikes Hall, (864) 656-2280) or the Bursar's Office (BO) (G-08 Sikes Hall, (864) 656-2321).

Financial Assistance

Assistantships are awarded on a competitive basis to qualified students, both domestic and international. All qualified students are considered for assistantships when applications are processed. Award decisions are based on academic record, test scores, statement of purpose, letters of recommendation, and availability of funds.

Graduate students are eligible for financial support if they are (1) enrolled in full-time graduate studies, (2) in good academic standing (i.e., not on probation), and (3) making satisfactory progress toward their degree. Tuition and fees for students receiving support is a reduced flat fee. To receive the reduced tuition and fees for a particular semester, a qualified student must be on the department payroll by end of the second week of that semester.

Employment Paperwork

If you have been awarded an assistantship, you must make an appointment with Mrs. Kris Coleman, the payroll clerk in the School of Computing. You can do this by e-mailing her at kcolem3@clemsun.edu or calling 864-656-5403. She will then set up an information session for you with the Budget Center to complete your hiring documentation. When you go to the Budget Center, you will need to take your social security card, photo identification, and a voided check.

Applying for Social Security Card and Directions to Anderson, SC

All employees in the United States are required to apply for a Social Security (SS) card. This card will be valid for the rest of your life; so, if you have a SS card from previous period, it is valid and you need to provide a copy of your SS card to OIA. If you need to apply for the SS card, there are three options available. (Option #1 is recommended for early arriving international faculty, staff, and students if they have been in the United States for more than 10 days.)

Option #1 to obtain a Social Security Card:

You may obtain a copy of the SS card application from the OIA. After the application process has been completed and approved by the SSA, the SS card will be issued from Baltimore, MD. This normally takes between two and four weeks' time. The SS card will be returned to OIA and you will be notified by e-mail to come and pick it up. Please read over the following visa-dependent procedures carefully and act accordingly.

The following documents are needed to apply for a Social Security card:

- (A) Foreign national faculty, researchers, or staff such as H1B, TN, or O need:
1. Official job offer letter from the university.
 2. Original valid passport with US entry visa.
 3. I-94 departure card and a properly completed SS application form.

IF YOU DO NOT HAVE THE DOCUMENTS LISTED ABOVE, YOU WILL NOT BE ALLOWED TO COMPLETE THE APPLICATION PROCESS.

When you apply for the SS card, you must request a receipt letter from the SSA office. Bring the receipt letter directly to OIA, E-301 Martin Hall, Attn: Director, International Employment and Tax Info.

(B) F -1 Visa students need:

1. SEVIS registration in OIA immediately upon arrival in Clemson.
2. Employment verification letter approved by the hiring department and an advisor in OIA.
3. Original valid passport containing your entry visa, I-94 card, and form I-20.
4. Photocopies of your passport, I-94 card, and form I-20 are to be given to the SSA representative only if you apply on campus. Completed SS application form.

IF YOU DO NOT HAVE THE DOCUMENTS LISTED ABOVE, YOU WILL NOT BE ALLOWED TO COMPLETE THE APPLICATION PROCESS.

When you apply for the SS card, you must request a receipt letter from the SSA office. Bring the receipt letter directly to OIA, E-301 Martin Hall, Attn: Director, International Employment and Tax Info.

(C) J-1 Visa students./scholars need:

1. To check in with the Director of Campus Immigration Services in OIA, E-301 Martin Hall before applying for the card, and must have form DS-2019.
2. Employment letter approved by an advisor in OIA.
3. Original valid passport containing your entry visa, I-94 card and form DS-2019.
4. Photocopies of your passport, I-94 card, and form I-20 are to be given to the SSA representative only if you apply on campus. Completed SS application form.
5. J2 visa holders also need a valid Employment Authorization Card

IF YOU DO NOT HAVE THE DOCUMENTS LISTED ABOVE, YOU WILL NOT BE ALLOWED TO COMPLETE THE APPLICATION PROCESS.

When you apply for the SS card, you must request a receipt letter from the SSA office. Bring the receipt letter directly to OIA, E-301 Martin Hall, Attn: Director, International Employment and Tax Info.

Things to remember

Fill out the SS application form completely and sign the document in the appropriate space. Print clearly so that your information will be entered into the system accurately and correctly. In BOX #2, insert the address of the OIA, if a label has not already been affixed to the document. The address should read: Clemson University, OIA, E-307 Martin Hall, Clemson, SC 29634-5714.

In BOX #3, mark the box entitled “Legal Alien Allowed to Work”.

Option #2 to obtain a Social Security Card:

International faculty, staff and students may go to the SSA office in Anderson, SC, directly and apply for their SS card. Students who have been awarded an assistantship and have arrived early, before the beginning of the semester, are encouraged to exercise this option to obtain your SS card as quickly as possible.

NOTE: you have been in the U.S. for at least ten (10) days and have reported to OIA prior to applying.

- Office address: 4Civic Center Blvd Extension, Anderson, SC 29625
- Located behind Anderson Mall, under the water tower.
- Hours of service: 8:30 AM – 3:00 PM
- Bus Transportation: take the free Clemson Area Transit (CAT) Bus to Anderson. This is the purple and orange that you see on College Avenue that stops at Sikes Hall on campus. The sign on the front of the bus says “Anderson, SC”. The bus operates from Central to Clemson to Pendleton to Anderson. The CAT bus will take you as far as the Wal-Mart in Anderson. Get a transfer pass on the CAT bus and take the Anderson Electric City Bus to the Anderson Mall. Be cautious and alert for busy highway traffic in this area.
- Driving Instructions: take highway US 76 to Anderson. From Hwy 76, turn right on Martin Luther King Blvd (before the Anderson Mall). Proceed to the 2nd traffic light and turn left on to Civic Center Blvd Extension. The SSA office is in the first building on the left.

See also the three (3) visa-dependent procedures (labeled as A, B, and C) above.

Option #3 to obtain a Social Security Card:

The SSA office will send a representative to campus for half a day at the beginning of the fall and spring terms so that you may apply on campus for your SS card. You will be notified at the International Student Orientation (ISO) as to the day, hours, and location of this on-campus registration. You may also learn of this visit to campus by the SS office at the OIA office. Receipt letters will be mailed from the Anderson SSA office directly to OIA office. Receipt letters will be mailed from the Anderson SSA office directly to OIA within 7 days for those who apply on campus.

This procedure has been established and agreed to by the Office of International Affairs of Clemson University and by Mr. Mike Walsh of the Social Security Administration, Anderson, SC.

See also the three (3) visa-dependent procedures (labeled as A, B, and C) above.

CU Student ID, Username and Tiger 1 Card

CUID

When you are accepted into the Graduate School, you will be issued a unique student identification number as part of your admissions acceptance packet. Your student ID is a 9-digit number you will use on forms and other official University business. It is often referred to as your “CUID”.

Your Clemson computer account

Also upon acceptance, you will be assigned Clemson University computer user identification. This is a permanent, unique-to-you identifier that you will use every time you access the Clemson computer network. You may see or hear it referred to as your “username” or “USERID”. Your username is a 4-8 character identification that generally consists of some part of your first and/or last name and designates your official Clemson University e-mail address (for example, Jones2@clemson.edu, where “Jones2” is the username). Your username gives you access to University systems such as e-mail, MyCLE/Blackboard, the Student Information System (iROAR), and the online Web Registration, wireless network, and public lab systems.

You may access the School's Unix-based computer resources by sitting down at a terminal in one of the labs, or remotely via SSH (Secure Shell) or XDMCP (X-Win32, X11). SSH and XDMCP connections are permitted to all School Unix-based computer systems from any on-campus network address. Only two systems are accessible from off-campus, access1.cs.clemson.edu and access2.cs.clemson.edu. In order to avoid overloading these systems, please SSH to one of the other lab systems before running resource-intensive commands. A partial list of lab systems to which you may SSH will be displayed directly after logging in to either of these systems.

SSH clients are typically built-in to Mac OS X and Unix-like systems. You can obtain the recommended SSH client for Windows from download.clemson.edu.

If you experience any problems with the School's Unix-based systems, please send e-mail to helpdesk@cs.clemson.edu.

Your Clemson E-mail

For new students, your Clemson and School of Computing e-mail has been set up to forward e-mail to your Google Apps account, username@g.clemson.edu. You can access this account by going to g.clemson.edu or by clicking on "Google Apps" on the Clemson "Current Student" page (www.clemson.edu/students). Although your Google Apps account will have the same username as your Clemson account, it will have a different password. To reset your Google Apps password, go to www.clemson.edu/emailforwarding, login with your Clemson username and password, click on the link "Reset my Google Apps password", then follow the instructions on that web page. We recommend that you do not set your Google Apps password to be the same as any of your other accounts.

E-mail is the official mode of communication in the SOC. You are responsible for announcements, inquiries, requests, etc., made by e-mail from all representatives of the school. You should check your e-mail regularly and respond in a timely fashion. Being unaware of an e-mail message is not an acceptable excuse.

Tiger 1 Card

Soon after you arrive, you will want to obtain your Tiger 1 Card. This is your official Clemson University photo ID card and gives you access to a variety of services throughout campus and around town, including:

- Library card
- Fike Recreation Center access card
- Athletic ticket privilege access
- Purchase discounted software through CCIT
- Personal debit card to access pre-deposited funds in a TigerStripe account (see tiger1.clemson.edu/content/tigerstripe_what.php for more information).

You must be registered for at least one class during the current semester to qualify for a Tiger 1 Card. Bring a photo ID (driver's license, state-issued ID card, or passport) to the Tiger 1 Card office located in the lobby of Fike Recreation Center. There is no charge for your first ID card. Always remember to carry your Tiger 1 Card with you at all times.

Housing, Area Information

Housing

New graduate students are housed on campus as space permits; and after all continuing student and freshman assignments are completed. The University has a small community of two-person apartments in Thornhill Village for single (unmarried) graduate students. In addition, single graduate students may request to live in other areas on campus, as space permits. Graduate students should call the Housing Office at (864) 656-2295.

The Clemson area offers students a host of off-campus housing choices in a wide range of prices. Consult a local realtor for options or more information. Some apartments do not include utilities (electric, water, phone, cable) as part of your lease agreement. You may need to make arrangements to have services connected by contacting the utility companies directly; your property manager/landlord should be able to provide you with the appropriate contact information.

CAT Bus

The Clemson Area Transit Service, known as the CAT Bus, is a free bus service provided by the City of Clemson. It offers fare-free shuttles around campus and around the Upstate, including service to Anderson, Central, and Seneca. For route information, visit their website at www.catbus.com.

Groceries, services, shopping

The Clemson area offers a variety of shopping opportunities. There are several grocery stores, banks, commercial laundries, and drug stores within just a few miles of campus, many of which are accessible by foot, bicycle, or CAT Bus. A wide range of restaurants are also available downtown and along Tiger Boulevard. The greater Upstate area, including Central, Seneca, Easley, and Anderson, provides even more products and services along CAT Bus routes or for those students with private transportation. Contact the Clemson Chamber of Commerce for more information (www.clemsonchamber.org).

GETTING THROUGH THE PROGRAM

Academic Integrity

A university is a community of scholars dedicated to the inquiry into knowledge. It follows as a basic tenet that students will conduct themselves with integrity in academic pursuits. In instances where the academic standards may have been compromised, Clemson University has a responsibility to protect this process and to respond appropriately and expeditiously to charges of academic misconduct.

Academic integrity policy

A summary of the Graduate School's policy on academic integrity. For a complete text of the policy, including rules and procedures, and specifics related to former students, academic research, and revocation of academic degrees, see the "Appeals and Grievances" section of the Graduate School website at gradspace.editme.com/academicRegulationsIndex.

I. Definitions, explanations, and examples of violations of academic integrity

- A. Cheating. Cheating involves giving, receiving, or using unauthorized aid on any academic work submitted for grading including coursework, laboratory assignments, research projects, comprehensive and qualifying examinations, theses and dissertations, or using computer center account numbers that belong to another person without the permission of the account owner. Unauthorized aid includes collaborating with classmates or others when explicitly prohibited, using online paper mills or paying individuals to prepare research papers, reports or projects, submitting identical work to satisfy the requirements of more than one class without the approval of the faculty, or using textbooks, notes, the web, and other sources when instructed to work alone.
- B. Fabricating/falsifying information. Fabricating or falsifying information involves actions such as making up data that were not collected, stating that studies were conducted that were not, indicating that original source material was read when information was obtained from secondary or tertiary sources, making up references not used, or identifying sources that were not consulted.
- C. Facilitating violations of academic integrity. Facilitating violations of academic integrity involves students intentionally assisting others to violate the principles of academic integrity (for example, allowing friends access to their work, or instructing students on ways to solicit aid on papers, projects, take home exams, tests for state and national licenses, etc).
- D. Failing to cite contributors. Failing to cite an author or multiple authors involves not giving credit to individuals who have contributed significantly to a work (paper, research project, poster, etc.) and claiming the final product as one's own.
- E. Plagiarizing. Plagiarizing is theft of the work accomplished by someone else. It includes copying words, phrases, sentence structure, computer code or files, images, or ideas from any source and attributing the work to one's own efforts. Blatant examples of plagiarism include:

(1) failure to cite consulted sources either in footnotes, endnotes, or within the body of the text of a document, and

(2) failure to use quotation marks, or to indent text of more than three lines, to mark text that has been copied word-for-word from a source

More subtle examples of plagiarism include:

(3) paraphrasing or using others' conceptual frameworks for developing creative works without acknowledgement or permission, and

(4) citing a source within the text at the location of use but then directly quoting the materials without the use of quotations marks or text indentation.

Citation of a source in a bibliography does not give you license to copy text from that source. You must use quotation marks or indentation (i.e., block quote) to mark text that is not yours, and you must provide a footnote/endnote superscript number or an embedded citation at the point of use of ideas or text that is not yours. Your goal is to structure your paper in a way that the reader can clearly distinguish your work from the ideas and written text obtained from your sources.

For more information about and examples of plagiarism, see www.grad.clemson.edu/plagiarism.php, www.clemson.edu/culib/Plagiarism/index.htm, www.indiana.edu/%7Eistd/examples.html, www.plagiarism.org.

For more information about and examples of citing sources see www.clemson.edu/culib/Plagiarism/Cite/CSE.htm, www.plagiarism.org/plag_article_how_do_i_cite_sources.html.

- F. Thwarting others' progress. Thwarting others' progress involves editing, deleting, or otherwise destroying computer files that belong to another person or intentionally stealing or destroying property which prevents others from using it to gain needed information to complete assignments, for example, library materials on reserve, materials on loan by a faculty member, or reports and documents made available for student use by external companies, state and federal agencies, etc.

Unless specified otherwise by the course instructor, the following examples are cases generally considered not cheating:

- Turning in work done alone or with the help of the instructor or designated aides (e.g., laboratory instructor).
- Submission of one assignment for a group of students if the group work is explicitly permitted (or required).
- Submitting material(s) obtained from the Internet and/or World Wide Web and attributing the source and author. Examples:

An article in an outline publication:

Craig Settles, "A Dose of Reality," Internet World, July 1996.
Available online <http://www.internetworld.com>

A code segment incorporated in a programming assignment:

```
/* the following code segment was obtained from the source code
/* listed at http://someplace.com/program/code/segment
*/
    code...
    code...
    code...
/* end of duplicated code segment */
```

The following may or may not be considered as cheating, depending upon the individual instructor's preferences:

- Getting or giving help on how to use debuggers, editors, utilities, etc. (some assignments may explicitly prohibit this).
- Getting or giving help on how to solve minor syntax errors.
- High-level discussion of course material for better understanding.
- Discussion of assignments to understand what is being asked for.
- Accepting help from friends, tutors, etc., and clearly acknowledging that help. However, there may be a grade penalty.
- The use of *re-engineering tools*, e.g., generating Java from byte code.

The instructor and the instructor's syllabus should be consulted by the student for specific details about what the instructor considers as incidents of academic dishonesty. If no additional guidelines are provided by the instructor, then these guidelines apply by default.

One over-riding guideline that will prevent misunderstandings is "***When you are in doubt, ask your instructor!***"

II. Levels of seriousness of violation

At the graduate level, it is expected that students exhibit sophistication in understanding the tenets of academic integrity. Even so, it is clear that some types of violations are more serious in nature than others and that some types of violations require deliberate, calculated actions on the part of the student. The Graduate School's policy categorizes academic integrity violations into four levels, ranging from an unawareness or minor misunderstanding, to an intention to defraud or otherwise engage in criminal-type activity. Each level of violation carries one or more sanctions, from verbal reprimand to permanent dismissal from the University; repeated violations, irrespective of the level, may result in more severe sanctions as well.

III. Graduate Academic Integrity Committee

The authority to resolve cases of violations of academic integrity by enrolled graduate students is vested in the Graduate Academic Integrity Committee (GAIC). The GAIC consists of four tenured faculty members from each of the five colleges, one graduate student from each college. An associate dean of the Graduate School serves as the non-voting administrative coordinator for the GAIC.

IV. Procedures

It is the responsibility of every member of the Clemson University community to enforce the academic integrity policy. Students and staff members should report violations of this policy to the faculty member for the affected course (including the research advisor or internship/practicum/co-op supervisor). When, in the opinion of anyone outside the University, there is evidence that a student has committed a violation of academic integrity, that person should bring the allegation to the attention of the associate dean of the Graduate School. The associate dean will contact the appropriate faculty representative of the student's program (consistent with the alleged violation).

When, in the opinion of the faculty member, a student has committed a violation of academic integrity, the faculty member will fully document the charge in writing in a statement delivered in a sealed envelope to the associate dean of the Graduate School. At the same time, at his or her discretion, the alleging faculty member is encouraged, but is not required, to privately inform the student charged of the nature of the allegation. Within three working days from the date the associate dean has received a formal charge of an alleged violation, he or she will provide the student with a copy of the charge and the

procedures of the GAIC. Those procedures vary depending on the level of the violation and whether the student chooses to pursue a hearing. For more information about the procedures, refer to gradspace.editme.com/academicRegulationsIndex.

Research integrity

The effectiveness of the research infrastructure throughout the world is based on the personal and professional integrity of the people involved. The central assumption to all research endeavors is that researchers have done what they say they have done. The School of Computing is part of that infrastructure and the research conducted here must withstand the highest scrutiny. Consequently, we must all ensure that our scholarly work is conducted and reported with the highest ethical standards. We must be careful in our record keeping and diligent in our efforts to always attribute credit where it belongs. In particular, we must guard against any activity that would bring the integrity of the school or the individuals within it into question. Among the activities to be avoided are:

- Falsification of data – ranging from fabrication to deceptively selective reporting of results or methods, including the purposeful omission of conflicting data with intent to falsify results.
- Plagiarism – representation of another's work as one's own.
- Misappropriation of others' ideas – the unauthorized use of privileged information, however obtained.

Requirements for the Doctoral Degree in Computer Science

The Ph.D. degree

The objective of the Doctorate of Philosophy (Ph.D.) program in the School of Computing is to prepare exceptionally qualified individuals for research careers in academia and industry. The program is designed for students who offer evidence of exceptional scholastic ability, intellectual creativity, and research motivation.

The Ph.D. degree is viewed as a certification by the faculty that the student has a solid foundation in computer science and has performed original research in the area. The basis for gaining the degree will be the student's grasp of the subject matter of computer science, competency to plan and conduct research, and ability to express ideas adequately and professionally in oral and written language. Although only four courses are required, the doctoral program usually requires two to four years beyond the M.S. degree.

The doctoral program emphasizes research, and the SOC encourages prospective candidates to involve themselves in research under the supervision of a faculty member at the earliest possible opportunity. In addition to research activities in various areas of computer science, there are many opportunities for interdisciplinary and interdepartmental research.

The Major Advisor and Advisory Committee

Selection of the Major Advisor is by mutual consent of the Ph.D. student and the advisor. The Major Advisor, who must be a full-time tenure track member of the Computer Science faculty, should be selected before the Portfolio is submitted. (The approval of the Portfolio Review serves as the comprehensive examination for SOC.) The Ph.D. student should carefully select his or her Major Advisor on the basis of technical and personal compatibility. Either the student or the Major Advisor may terminate the advisee/advisor relationship in the event that research interests change or the advisor and student later find themselves incompatible.

The Ph.D. Advisory Committee assists the student in formulating an appropriate program of study, approves this program of study, approves the dissertation proposal, and conducts the dissertation defense. The Major Advisor serves as chair of the student's Advisory Committee. The student, in consultation with the Major Advisor and in accordance with Graduate School requirements, must select at least two additional faculty members to serve on the Advisory Committee. One of these members may be selected from outside the SOC. One additional member of the student's Advisory Committee will be appointed the Director of Graduate Affairs (DGA).

The Advisory Committee must be approved by the DGA when the student submits the GS-2 form, containing the program of study, and then by the School Director, or his or her designee, when the formal GS2 is approved. The GS2 forms must be completed and approved by the end of a Ph.D. student's third semester.

University Policy Regarding Length of PhD Degree

The Ph.D. Advisory Committee aids the student in developing a degree curriculum which includes the selection of specific courses and their sequence. At Clemson University, a minimum of 30 credits past the masters and 60 credits past the bachelors degree are required for the doctoral degree. A minimum of 18 credit hours of doctoral research is required. Should the direction of study or research interest change, the

student may request the appointment of a new Major Advisor. Coursework leading to the Doctor of Philosophy degree is planned to give the student a comprehensive knowledge of his/her field of specialization and a mastery of the methods of research. The degree is not awarded solely on the basis of coursework completed, residence, or other routine requirements. The final basis of granting the degree is the student's grasp of the subject matter of a broad field of study, competence in planning and conducting research, and ability to express him/herself adequately and professionally orally and in writing.

Types of requirements

Ph.D. students must satisfy requirements in three areas:

- Coursework and seminars
- Examinations
- Research

Coursework and seminars

a) Entering With A Master's Degree In Computer Science

A Ph.D. program of study consists of:

- 1 credit hour of Introduction to Faculty Research (typically in your first semester),
- 3 credit hours of Research Experience (typically in your second semester as 888 or 95x credits),
- at least 12 credit hours of coursework beyond the Master's degree,
- at least 6 additional credit hours of Ph.D. seminar courses (CPSC 95x0), and
- 18 credit hours of doctoral research (CPSC 9910).

The required 12 credit hours of course work beyond the Master's degree may be satisfied by taking four 800-level courses (exclusive of 8810, 888, 95x0, 9810, and 9910). However, one CPSC 8810 course or one 3-credit-hour 8000-level course from outside the School of Computing may be included in the 12 credit hours with the approval of both the student's advisor and the Director of Graduate Affairs.

Course planning should also take into account the need for demonstrating core competencies for the Portfolio Review (see [Ph.D. Examination Requirements](#)). Taking courses in four core areas and demonstrating superior mastery of the material is a typical way in which to satisfy the competencies.

Full-time students in the Ph.D. program are encouraged to take one seminar (CPSC 95x0 and 9810) per semester until passing the comprehensive exam and one per year until completion of the program.

b) Direct Entry Into The Ph.D. Program

A select group of students who hold only undergraduate degrees may be directly accepted into the Ph.D. program. These students must complete additional coursework.

Ph.D. students without a Master's degree in Computer Science or equivalent are required to complete at least 30 credit hours of approved graduate-level computer science courses, at least 12 of which must be taken at Clemson to satisfy the 12 credit hours of coursework beyond the Master's as listed in the Ph.D. program of study above.

Up to 6 credit hours of 6000-level coursework at Clemson may be counted toward the required 30 credit hours. Up to 6 credit hours of 8810 may also be counted.

All other requirements listed in the Ph.D. program of study above must also be met. A Ph.D. program of study for a direct-entry student would therefore consist of

- 1 credit hour of Introduction to Faculty Research (typically in your first semester),
- 3 credit hours of Research Experience (typically in your second semester as 8880 or 95x0 credits),
- at least 30 credit hours of coursework (at least 24 of which must be taken at the 8000-level),
- at least 6 additional credit hours of Ph.D. seminar courses (CPSC 95x0),
- 18 credit hours of doctoral research (CPSC 9910), and
- 2 additional credit hours to meet the university's 60-credit-hour minimum for direct-entry.

Course planning should also take into account the need for demonstrating core competencies for the Portfolio Review (see [Ph.D. Examination Requirements](#)). Taking courses in four core areas and demonstrating superior mastery of the material is a typical way in which to satisfy the competencies.

There is also an option for direct-entry students to obtain a Master's degree en-route to the Ph.D. degree. Please talk with the Director of Graduate Affairs for more details on this option.

See a complete listing of courses offered in SOC and their descriptions at [Appendix A](#).

Examinations

To earn the Ph.D. degree a student must take and pass three examinations:

- The Comprehensive Examination / Portfolio Review
- The Dissertation Proposal
- The Dissertation Defense

The Comprehensive Exam / Portfolio Review

To be admitted to Ph.D. candidacy a student must pass the Comprehensive Examination, which in SOC is known as the Portfolio Review. The form of this examination is a review of submitted materials and is performed by the Graduate Affairs Committee (GAC) on behalf of the graduate faculty. This review is intended to certify competency in core areas of computer science, and to promote scholarship, research, and professional skills. A Ph.D. student is expected to prepare and submit his/her Portfolio no later than after:

- Five (5) semesters of admission to the graduate program if the student does not have a Master's degree at the time of entry into the program, or,
- Three (3) semesters of admission to the graduate program if the student already has a Master's degree.

The student is solely responsible for the contents of the Portfolio, and so it is very important to begin the preparation of the Portfolio early and to solicit the help of your Major Advisor in its preparation. When the complete Portfolio is submitted it is reviewed by GAC, which serves as the examining committee for the comprehensive examination. A student who is denied admission to candidacy may, at the discretion of

the faculty, be given one additional chance to correct the deficiencies that were identified. Graduate School regulations require that a student who fails the Comprehensive Examination a second time be dismissed from the graduate program.

The Portfolio must demonstrate that the student has superior mastery of core computer science and indicate that the student has the ability to conduct original research and make an acceptable written presentation of the results.

Required Elements of the Portfolio

- **Statement of Purpose.** The student should *briefly* state why he/she is seeking to become a Ph.D. candidate. The statement is also a student's opportunity to summarize past accomplishments and future goals. This is a chance to speak directly to the GAC and the faculty regarding any issue relevant to the issue of candidacy.
- **Brief curriculum vitae.** This C.V. should include elements that are *relevant* to the student's application to Ph.D. candidacy. Academic honors and awards are appropriate. Outside interests (e.g., fishing, golf, or cricket) are not.
- **Letters of recommendation.** Two supporting letters from CS faculty members are required. Additional letters from faculty in SOC and other departments, industrial collaborators, and from former students may be included at applicant's discretion. Letters are strictly confidential.
- **Demonstration of core competencies.** Students must demonstrate superior mastery of the material in four of seven core areas of computer science. The core areas are identified as follows:

<i>Ph.D. Core Areas</i>	<i>Courses</i>
Algorithms and Theory	8380, 8390, 8400
Graphics and Visualization	8050, 8170, 8190
Computer Networks	8510, 8520, 8530
Information Management	8620, 8630, 8650
Languages and Translators	8270, 8280, 8290
Software Engineering	8720, 8730, 8750
Systems	8200, 8220, 8240, 8550

One course should be selected from each of four core areas. At least one of the four selected core courses must be from the *Formal Thinking* course grouping, which consists of: 8280, 8380, 8390, 8400, and 8730. At least one of the four selected core courses must be from the *Implementation* course grouping, which consists of 8050, 8170, 8190, 8220, 8270, 8290, 8520, 8530, 8550, 8620, and 8650.

A grade of A in each chosen core course and a strong letter of support from each instructor is expected. Up to two of these courses may come from another university.

Another possible mechanism for demonstrating mastery includes published research in the area.

- **Demonstration of potential for success in research.** A research paper in which a significant component of the writing was done by the candidate must be included. The paper should be of sufficient quality to indicate that the student has the ability to conduct original research and make an acceptable written presentation of the results. Although not required, students are strongly

encouraged to submit the paper to a conference or workshop. For such submissions, the student may be the sole author or may be a co-author with other faculty and/or other students. *However, if the paper has joint authorship, the other authors must submit written documentation identifying those sections of the paper that were written by the candidate.* The paper does not have to be accepted or published to be included in a successful Portfolio. Although a published paper provides more convincing evidence for research potential, a rejected submission, along with peer reviews, can also be used by the Graduate Affairs Committee to evaluate potential in research. The paper may or may not be related to the student's eventual dissertation area. A candidate's M.S. research paper, thesis, or a derivative thereof may be used to satisfy this requirement.

Optional Elements of the Portfolio

Other evidence of research ability: The Portfolio must contain evidence of the ability to conduct research. The student has a great deal of latitude with respect to evidence that speaks to this requirement. Examples include:

- *Publications* - technical reports, workshops, conference proceedings, journal articles, M.S. research papers. These may include papers in which the candidate was not the primary author. In cases of joint authorship, the candidate should indicate as succinctly as possible his or her role in the research and writing.
- *Projects* - seminar and independent study projects
- *Invited lectures* - on one's research
- *Critical analysis* - an annotated bibliography, reviewed papers

The GAC will be looking for evidence of specific research skills, including: the ability to identify a problem, evidence of scholarship, critical analysis, and communication skills (e.g., writing and speaking). Students are encouraged to include *all* such evidence in the Portfolio.

Other material: At the discretion of the student and the adviser, other material may be included in the Portfolio. Students may report all forms of research, teaching, and service to the discipline when preparing their Portfolios. Here, in more detail, are some of the items a student might include:

- *Significant accomplishments* - An informal statement of the two or three things that the student is most proud of in this period. Examples include earning an "A" in a difficult course, finishing an M.S. research paper, or having a peer-reviewed paper accepted.
- *Honors and Awards* - Awards of competitive fellowships and induction into honor societies.
- *Presentations* - Typical categories include seminars, professional presentations, and tutorials. Include workshop presentations, paper presentations in classes, paper presentations at conferences.
- *Proposals (in preparation, in review, and accepted)* - Include fellowship applications, grant applications, applications to industrial affiliates, requests for travel money from conference organizers, etc. Note the status of the proposal (in preparation, under review, accepted, rejected, under revision, etc.)
- *Professional Reviewing* - Include reviewing for journals, conferences, workshops, and book prospecti. Include other significant internal reviewing; for example, if more than a few hours were spent reviewing drafts of papers or proposals for faculty members.
- *Service* - Include University and SOC service other than research and teaching. Examples include service on standing and ad hoc SOC committees or as a graduate student representative.

The dissertation proposal

The dissertation proposal is a SOC document that is presented to the student's Advisory Committee. The purpose of the proposal is to inform the committee of the nature and scope of the proposed dissertation and to obtain their approval and guidance concerning the proposed research. The written proposal should include the following items:

- an outline of the included material
- a concise review of the state of knowledge in the general area of interest
- a description of the proposed dissertation area, along with a concise review of the state of knowledge in the specific area of the proposed dissertations
- a concise explanation of the problem(s) to be investigated
- a discussion of the results expected from solving the problem(s) and their impact on the state of knowledge in the general and specific areas of interest.
- a bibliography

The written proposal must be approved by the student's Advisory Committee and communicated through a public oral presentation. The presentation will be scheduled with the approval of the Advisory Committee, and the written document must be available to the Advisory Committee at least two weeks before the approval is given. The Advisory Committee will be asked to give written approval of the proposal after the presentation, and that approval will be primarily based on the written document. If the proposal is not approved, the proposal may be repeated an indefinite number of times subject to the approval of the Advisory Committee. The proposal must be presented and approved at least six (6) months before the dissertation is completed.

The dissertation proposal serves several purposes. It is a way to ensure that the student has a clear grasp of a specific problem or set of problems; it provides a format for discussion of the solutions or approaches to solving the research problem; and, it provides documentation that the student has undertaken a reasonable literature survey in the research area.

The dissertation defense

The student will present a summary of the dissertation at a School of Computing colloquium. This presentation must include an explanation of the problem addressed, a description of results, and an explanation of the significance of the results. After the presentation, a brief period may be allocated for questions from the general audience.

At the end of the question period, the Final Doctoral Oral Examination will be conducted by the student's Advisory Committee. Members of the faculty, as well as members of GAC, and the Dean of the Graduate School are invited to attend this examination. This final examination demands a broad and penetrating interpretation by the student of the research project and its conclusions. It may also include examination of the student in the major and minor fields of specialization.

A student who fails the final oral examination may be allowed a second opportunity if the Advisory Committee recommends it. Failure of the second examination will result in dismissal from the Graduate School.

Research

To earn the Ph.D. degree a student must complete these research requirements:

- The Dissertation
- At least one publication

The doctoral dissertation

The research requirement is the most important aspect of Ph.D. study. The doctoral dissertation is the written record of the research that the student has conducted and *must* provide evidence of the student's ability to independently perform original research leading to the discovery of significant new knowledge. Thus, the dissertation should demonstrate the student's technical mastery of the subject, independent scholarly work, and conclusions that modify or enlarge what has previously been known.

The dissertation is expected to:

- Identify a significant open question or problem in computer science.
- Describe the current state knowledge of the area(s) involved.
- Present a solution or solutions to the problem that was identified.
- Report on the results of the research conducted, substantiate those results, and demonstrate the originality and contribution of the results.

The format of the dissertation must conform to the current SOC and Graduate School standards. Copies of the dissertation must be delivered to the student's Advisory Committee members at least two (2) weeks prior to the final oral examination.

Publication requirement

Prior to graduation, each Ph.D. student must publish (or have accepted for publication) results of the research leading to the dissertation. The paper must be fully refereed and published (or accepted) in the proceedings of a computer science conference or in a computer science journal. The paper may be co-authored with the Major Advisor.

Requirements for the Human-Centered Computing Doctoral Degree

The Ph.D. degree

The objective of the Doctorate of Philosophy (Ph.D.) Human-Centered Computing (HCC) degree program is to prepare our graduates for advanced research positions in industry and the academy. The program is designed for students who offer evidence of exceptional scholastic ability, intellectual creativity, and research motivation. The HCC Ph.D. degree is viewed as a certification by the faculty that the student has a solid foundation in Human-Centered Computing and has performed original research in the area. The basis for gaining the degree will be the student's grasp of computing, people, research methods and a cognate or specialty area. The graduates will have extended the frontier of knowledge in at least one area of computing as it relates to a human condition or concern by way of innovative research. The students will demonstrate the ability to express ideas adequately and professionally in oral and written language. Although only four courses are required, the doctoral program usually requires two to four years beyond the M.S. degree.

The doctoral program emphasizes research, and the SOC encourages prospective candidates to involve themselves in research under the supervision of a faculty member at the earliest possible opportunity. In addition to research activities in various areas of computing and people, there are many opportunities for interdisciplinary and interdepartmental research.

The Major Advisor and Advisory Committee

Selection of the Major Advisor is by mutual consent of the Ph.D. student and the advisor. The Major Advisor, who must be a full-time tenure track member of the School of Computing faculty, should be selected before the Portfolio Review, which is the comprehensive examination for SOC. The Ph.D. student should carefully select his or her Major Advisor on the basis of technical and personal compatibility. Either the student or the Major Advisor may terminate the advisee/advisor relationship in the event that research interests change or the advisor and student later find themselves incompatible.

The Ph.D. Advisory Committee assists the student in formulating an appropriate program of study, approves this program of study, approves the dissertation proposal, and conducts the dissertation defense. The Major Advisor serves as chair of the student's Advisory Committee. The student, in consultation with the Major Advisor and in accordance with Graduate School requirements, must select at least two additional faculty members to serve on the Advisory Committee. One of these members may be selected from outside the SOC. One additional member of the student's Advisory Committee will be appointed the Director of Graduate Affairs (DGA) for the Human-Centered Computing Division.

The Advisory Committee must be approved by the DGA for the HCC Division when the student submits the GS-2 form, containing the proposed program of study, and then by the School Director, or his or her designee, when the formal GS2 is approved. The GS2 forms must be completed and approved by the end of a Ph.D. student's third semester.

University Policy Regarding Length of PhD Degree

The Ph.D. Advisory Committee aids the student in developing a degree curriculum, which includes the selection of specific courses and their sequence. At Clemson University, a minimum of 30 credits past the masters and 60 credits past the bachelors degree are required for the doctoral degree. A minimum of 18 credit hours of doctoral research is required. Should the direction of study or research interest change, the student may request the appointment of a new Major Advisor. Coursework leading to the Doctor of Philosophy degree is planned to give the student a comprehensive knowledge of his/her field of

specialization and a mastery of the methods of research. The degree is not awarded solely on the basis of coursework completed, residence, or other routine requirements. The final basis of granting the degree is the student's grasp of the subject matter of a broad field of study, competence in planning and conducting research, and ability to express him/herself adequately and professionally orally and in writing.

Types of requirements

Ph.D. students must satisfy requirements in three areas:

- Coursework and seminars
- Examinations
- Research

Coursework and seminars

a) Entering With A Master's Degree In Computer Science

A Ph.D. program of study consists of:

- 3 credit hours of HCC 831: Fundamentals of Human-Centered Computing,
- at least 12 credit hours of coursework beyond the Master's degree,
- 6 credit hours of pre-dissertation research, HCC or CPSC 888,
- 18 credit hours of dissertation research, HCC or CPSC 991

The required 12 credit hours of course work beyond the Master's degree will be selected under the advisement of the student's Major Advisor and the DGA for the HCC Division.

Full-time students in the HCC Ph.D. program are encouraged to take one seminar (HCC or CPSC 95x and 981) per semester until passing the comprehensive exam and one per year until completion of the program.

b) Direct Entry Into The Ph.D. Program

A select group of students who hold only undergraduate degrees may be directly accepted into the HCC Ph.D. program. These students must complete additional coursework. HCC Ph.D. students without a Master's degree are required to complete at least 30 credit hours of approved graduate-level courses, at least 12 of which must be taken at Clemson University to satisfy the 12 credit hours of coursework beyond the Master's as listed in the HCC Ph.D. program of study above. A Ph.D. program of study for a direct-entry student would therefore consist of

- 3 credit hours of HCC 831: Fundamentals of Human-Centered Computing,
- 12 credit hours of Computing courses, HCC or CPSC 600 and 800 level,
- 6 credit hours from the people track,
- 6 credit hours of research methods,
- 9 credit hours of a cognate or specialty area,
- 6 credit hours of pre-dissertation research, HCC or CPSC 888,
- 18 credit hours of dissertation research, HCC or CPSC 991

Full-time students in the HCC Ph.D. program are encouraged to take one seminar (HCC or CPSC 95x and 981) per semester until passing the comprehensive exam and one per year until completion of the program.

There is also an option for direct-entry students to obtain a Master's degree en-route to the HCC Ph.D. degree. Please talk with the Director of Graduate Affairs for the HCC Division for more details on this option.

Examinations

To earn the Ph.D. degree a student must take and pass three examinations:

- The Comprehensive Examination / Portfolio Review
- The Dissertation Proposal
- The Dissertation Defense

The Comprehensive Exam / Portfolio Review

To be admitted to Ph.D. candidacy a student must pass the Comprehensive Examination, which in the SOC is known as the Portfolio Review. The form of this examination is a review of the submitted materials and is performed by the Graduate Affairs Committee (GAC) on behalf of the graduate faculty. This review is intended to certify competency in the core areas of Human-Centered Computing, which are computing, people and research methods. Also, the review is intended to promote scholarship, research, and professional skills. A HCC Ph.D. student is expected to prepare and submit his/her Portfolio no later than after:

- Five (5) semesters of admission to the graduate program if the student does not have a Master's degree at the time of entry into the program, or,
- Three (3) semesters of admission to the graduate program if the student already has a Master's degree.

The student is solely responsible for the contents of the Portfolio, and so it is very important to begin the preparation of the Portfolio early and to solicit the help of your Major Advisor in its preparation. When the complete Portfolio is submitted it is reviewed by GAC, which serves as the examining committee for the comprehensive examination.

A student who is denied admission to candidacy may, at the discretion of the faculty, be given one additional chance to correct the deficiencies that were identified. Graduate School regulations require that a student who fails the Comprehensive Examination a second time be dismissed from the graduate program.

The Portfolio must demonstrate that the student has mastery of the HCC core areas and indicate that the student has the ability to conduct original research and make an acceptable written presentation of the results.

Required Elements of the Portfolio

1. **Transcripts** - minimum GPA will be 3.5
2. **Writing Sample** – The sample does not have to be a published article, but that helps. The student must be the first author.
3. **Statement of Purpose** - The student must describe her/his research interests as it relates to HCC,

limited to 1 page. This will include a list of courses that student plans to take, if the student is not done with her/his coursework.

4. **Plan of Study** – The plan of study should be consistent with the student’s statement of purpose.
5. **Major Advisor’s Letter of Support** - The student will submit her/his portfolio under direction of her/his advisor. The advisor will provide a letter of support for the student.
6. **Student’s Curriculum Vita** - A copy of the student's CV is required.
7. **Optional Items** – The committee will accept optional items such as:
 - a. The committee will consider code or an implementation
 - b. Other items that support readiness.

The GAC will be looking for evidence of specific research skills, including: the ability to identify a problem, evidence of scholarship, critical analysis, and communication skills (e.g., writing and speaking). Students are encouraged to include *all* such evidence in the Portfolio.

The dissertation proposal

The dissertation proposal is a SOC document that is presented to the student's Advisory Committee. The purpose of the proposal is to inform the committee of the nature and scope of the proposed dissertation and to obtain their approval and guidance concerning the proposed research. The written proposal should include the following items:

- an outline of the included material
- a concise review of the state of knowledge in the general area of interest
- a description of the proposed dissertation area, along with a concise review of the state of knowledge in the specific area of the proposed dissertations
- a concise explanation of the problem(s) to be investigated
- a discussion of the results expected from solving the problem(s) and their impact on the state of knowledge in the general and specific areas of interest.
- a bibliography

The written proposal must be approved by the student’s Advisory Committee and communicated through a public oral presentation. The presentation will be scheduled with the approval of the Advisory Committee, and the written document must be available to the Advisory Committee at least two weeks before the approval is given. The Advisory Committee will be asked to give written approval of the proposal after the presentation, and that approval will be primarily based on the written document. If the proposal is not approved, the proposal may be repeated an indefinite number of times subject to the approval of the Advisory Committee. The proposal must be presented and approved at least six (6) months before the dissertation is completed.

The dissertation proposal serves several purposes. It is a way to ensure that the student has a clear grasp of a specific problem or set of problems; it provides a format for discussion of the solutions or approaches to solving the research problem; and, it provides documentation that the student has undertaken a reasonable literature survey in the research area.

The dissertation defense

The student will present a summary of the dissertation at a School of Computing colloquium. This presentation must include an explanation of the problem addressed, a description of results, and an explanation of the significance of the results. After the presentation, a brief period may be allocated for questions from the general audience.

At the end of the question period, the Final Doctoral Oral Examination will be conducted by the student's Advisory Committee. Members of the faculty, as well as members of GAC, and the Dean of the Graduate School are invited to attend this examination. This final examination demands a broad and penetrating interpretation by the student of the research project and its conclusions. It may also include examination of the student in the major and minor fields of specialization.

A student who fails the final oral examination may be allowed a second opportunity if the Advisory Committee recommends it. Failure of the second examination will result in dismissal from the Graduate School.

Research

To earn the Ph.D. degree a student must complete these research requirements:

- The Dissertation
- At least one publication

The doctoral dissertation

The research requirement is the most important aspect of Ph.D. study. The doctoral dissertation is the written record of the research that the student has conducted and *must* provide evidence of the student's ability to independently perform original research leading to the discovery of significant new knowledge. Thus, the dissertation should demonstrate the student's technical mastery of the subject, independent scholarly work, and conclusions that modify or enlarge what has previously been known.

The dissertation is expected to:

- Identify a significant open question or problem in HCC.
- Describe the current state knowledge of the area(s) involved.
- Present a solution or solutions to the problem that was identified.
- Report on the results of the research conducted, substantiate those results, and demonstrate the originality and contribution of the results.

The format of the dissertation must conform to the current SOC and Graduate School standards. Copies of the dissertation must be delivered to the student's Advisory Committee members at least two (2) weeks prior to the final oral examination.

Publication requirement

Prior to graduation, each HCC Ph.D. student must publish (or have accepted for publication) results of the research leading to the dissertation. The paper must be fully refereed and published (or accepted) in the proceedings of a conference or in a journal. The paper may be co-authored with the Major Advisor.

Requirements for the Master's Degree in Computer Science

The M.S. degree

The Master of Science (M.S.) program in the School of Computing prepares individuals for a Ph.D. program, research careers in industry, or advanced technical positions in industry and government. The program is designed for students who offer evidence of above-average scholastic ability at the undergraduate level. During the M.S. program of study, the student will choose a concentration of study in one of six core areas and will choose courses in at least three other core areas for breadth:

- Applications
- Computing Foundations
- Graphics and Visualization
- Interactive Computing
- Software Engineering
- Systems and Implementation

Completion of the M.S. program normally requires from one and one-half years to two years beyond the Bachelor's degree but may require additional time for students whose undergraduate degree is in an area other than computer science. Two academic years usually are required for the completion of the M.S. degree if financial assistance is provided.

All requirements of the Graduate School for the M.S. degree must be met. A student's program of study must be approved by both the student's Advisory Committee and the DGA.

M.S. options

Two options are provided in the M.S. program:

- The coursework-only option
- The thesis option

The coursework-only option

In this option, a student is required to complete ten (10) approved courses. There is no separate final presentation or examination required for the degree.

The thesis option

The thesis option is designed for students who have a strong interest in research and who can complete an original and creative research project. The quality of the research and presentation should be such that the thesis or a derivative work is acceptable for publication in a refereed conference proceedings or archival journal.

The final examination is an oral examination conducted by the student's Advisory Committee. The student is expected to demonstrate an in-depth understanding of both the research results presented and the pre-existing body of knowledge that the results extend.

A student pursuing the thesis option must include six (6) credit hours of CPSC 8910 credit among the 30 credit hours used to satisfy the requirements for graduation.

Course requirements

The basic requirement for the M.S. in CS is successful completion of thirty (30) credit hours of approved courses. A student must have a grade point average of at least 3.0 in the 30 credit hours used to satisfy the requirements for graduation.

At least twenty-one (21) of the 30 credit hours must be at the 8000 level for the coursework-only option, and at least twenty-four (24) of the 30 credit hours must be at the 8000 level for the thesis option. Normally, students in either option may include up to six (6) credit hours of approved courses from outside the SOC; these 6 credit hours of approved courses may include courses transferred from another university. An exception is made for special program students from USTC, who may include up to ten (10) credit hours of approved transfer courses from USTC.

Concentration Requirement: Each student must take at least three courses in one core area. These courses can be selected from among the regularly-scheduled courses listed in the table below or from more advanced courses occasionally offered in that same area, including CPSC 8810 special topics courses in that area.

MS Core Area	Courses
Applications	6620, 8100, 8450, 8620, 8630, 8650, 8770, Pattern Recog. for Identity Science, Info. Retrieval, Adv. Bioinformatics
Computing Foundations	8280, 8380, 8390, 8400, 9400
Graphics and Visualization	6040, 6050, 8050, 8090, 8170, 8190
Interactive Computing	6110, 6140, HCC 8310, Creative Learning Tech., Meas./Eval. of HCC Systems, Mobile Device SW Dev., Spoken Lang. Systems
Software Engineering	8700, 8710, 8720, 8730, 8750
Systems and Implementation	6060, 8200, 8220, 8240, 8270, 8290, 8300, 8510, 8520, 8540, 8550

Breadth Requirement: Each student must take one course in at least three other core areas.

Thesis Option – Formal Thinking and Implementation Requirements: Each student in the thesis option must take at least one course from the Formal Thinking course grouping, which consists of: 8280, 8380, 8390, 8400, and 8730; and, each student in the thesis option must take at least one course from the Implementation course grouping, which consists of 8050, 8170, 8190, 8220, 8270, 8290, 8520, 8530, 8550, 8620, and 8650. A course taken for one of these requirements can be double-counted to satisfy this requirement and either the concentration or breadth requirement.

Course Exclusions: Of the 30 credit hours of approved courses required for graduation, the student cannot include credit for CPSC 6280, 8010, 8880, or 9500; and the student may not include credit for DPA 6000-6030, 8600, or 8800. Additionally, only one 6810, 8810 or 9810 can be included and only if the course is one in which a final exam is given.

The Advisory Committee

The Director of Graduate Affairs is the initial advisor of all new graduate students. At the end of the first semester of study each M.S. student pursuing the thesis option should form an Advisory Committee. (See the discussion of the GS-2 form later in this document.) Coursework-only students will be assigned an advisory committee from the members of the Graduate Affairs Committee.

The chair of the M.S. Advisory Committee serves as the student's Major Advisor. The Major Advisor must be a tenured or tenure-track faculty member in the School of Computing. The student is also permitted to select one additional member of the Advisory Committee. The additional member may come from outside the School of Computing. The Director of Graduate Affairs will assign the third member.

Selection of both the Major Advisor and the second member of the student's Advisory Committee is by mutual consent of the student and the faculty members. A student is free to dissolve an existing Advisory Committee and form a new one at any time. Likewise, the Major Advisor is free to dismiss a student. If a student is unable to find a Major Advisor, one will be appointed by the School Director.

Academic Requirements

Minimum GPA

A graduate student must maintain a minimum overall average of B (3.0) for all courses taken. If at any time you fail to satisfy this requirement, you may be placed on academic probation or you may be dismissed from the degree program at the recommendation of the GAC. If placed on probation, you are typically permitted only one probationary semester during the entire course of your graduate program, and you will not be eligible for financial aid/assistantship.

Requirement of academic integrity

The awarding of an advanced degree does not merely attest to completion of academic requirements in courses, seminars and research activities, but also to the acquisition of acceptable professional standards, including standards of ethics (see the University's [Academic Integrity Policy](#)). Violations of professional standards may result in disciplinary action, including dismissal from the program.

Maximum enrollment

The upper limits on graduate student enrollment per semester, as outlined in the table below, refer to graduate and undergraduate credits combined and should be attempted only by the most qualified students. Should the six-week and three-week sessions run concurrently, the total credits are not permitted to exceed the upper limit for the six-week session. Graduate students paid solely on an hourly basis are not classified as graduate assistants but are subject to the same limitation in credit loads.

<u>Student Category</u>	Maximum Credit Hours		
	<u>Semester</u>	<u>6-Week Session</u>	<u>3-Week Session</u>
Full-time Students	15	6	3
1/4-time Graduate Assistants	15	5	3
1/2-time Graduate Assistants	12	4	2
3/4-time Graduate Assistants	12	3	1
Persons employed full-time	9	3	1

Quarter-time, half-time and three-quarter-time graduate assistants are defined as those who contribute an average of 10, 20 and 30 clock hours per week, respectively, of service to the University for the entire semester. A person employed full time is defined as anyone employed five full working days per week regardless of the employer(s). A graduate student who becomes employed full-time, while the assistantship is in force, must notify the Graduate School and the department/school providing the assistantship.

Incomplete coursework

A grade of Incomplete will be given only if you have not completed the course for some unavoidable reason that is acceptable to the instructor. Unless you complete the requirements for removal of the I grade within the time period stipulated by University policy, the Student Records Office will automatically change the I to an F. Extensions of the deadline for completing the coursework are granted

only in extreme circumstances. Students who have Incompletes cannot graduate, even if the incomplete courses are not part of your GS2 plan of study. Special courses that constitute multi-semester projects are exempt from this rule. Incomplete grades for those courses may be given until the project is complete.

Enrollment on a Pass/Fail basis

The only graduate courses that may be taken on a pass/fail basis are thesis and dissertation research and a small number of unstructured courses in which the pass/fail grading system appears in the course description.

Auditing courses

Permission for a student to audit a particular graduate course is at the discretion of the School Director, the DGA, and/or the instructor offering the course. The principal factors involved in granting permission are that the auditor must possess the necessary academic background and space must be available.

Audited courses do not carry credit and the fact that a course has been audited is not noted on your official record. Graduate auditors are not required to take tests or exams. However, the instructor, at his/her own discretion, may demand the auditor's participation in class to whatever extent deemed desirable.

You may not satisfy, by audit, a stated prerequisite for a graduate course. Additionally, you may not establish credit through examination in any course for which you were previously registered as an auditor.

Withdrawing from courses

As a graduate student in the SOC, you should drop courses in which you are enrolled only in exceptional cases. If you drop a course when you have an assistantship, and your course load drops below nine (9) credit hours, your assistantship may be revoked for that semester.

Repeating a course

Under some circumstances, graduate students may repeat courses in which they received a D or F. If you repeat a course for which you received a grade of D or F, the original D or F is not dropped. The credit hours and grades from the original course and from the repeated course will all be counted in your GPA.

Continuous enrollment, leave of absence

Graduate students who do not maintain continuous enrollment are subject to the requirements in effect at the time you return. Only students who are enrolled are eligible to use University facilities and human resources. Note that you must meet minimum enrollment requirements to be eligible for financial aid (see [Assistantships/Financial Support](#) below). CP SC 8880, 8910, and 9910 may be used to effect continuous enrollment.

All graduate students in the program are expected to maintain continuous enrollment during fall and spring semesters. SOC makes every effort to schedule relevant courses such that students can easily maintain enrollment.

Students failing to maintain continuous enrollment (excluding summer terms) must apply to the Graduate School for re-entry and obtain approval from their department/school.

Withdrawing from the program/University

If for any reason you decide to withdraw from the program, inform your Major Advisor, then the DGA, who will inform you of the of the procedures to be followed to officially withdraw from the University. Failure to follow the procedures may result in you owing tuition and other fees to the University. This applies to both domestic and international students.

Plan of study (GS2)

Your graduate degree curriculum should be planned very early in your program, and the Graduate Degree Curriculum Form (Form GS2) should be filed by the middle of your second semester as an M.S. student or by the end of your third semester as a Ph.D. student. Filing the form early in your program limits the possibility of confusion between you and your Major Advisor on graduation requirements and timelines. In any case, you must file your final Form GS2 with the Graduate School no later than the last day of classes of the term before the term in which you plan to graduate. The Form GS2 identifies the ten (10) courses that will be used by the student to satisfy the requirements for the M.S. degree or the four (4) courses that will be used to satisfy the requirements of the Ph.D. degree

To file the Form GS2 the student must first consult with his/her Major Advisor and Advisory Committee, determine which courses are to be included. After the GS-2 has been completed, it must be submitted to the DGA for approval. After the GS-2 has been approved by the DGA, it should be submitted to the school's Student Services Graduate Program Coordinator (SSGPC).. The plan of study may be later revised as necessary by submitting a new GS-2.

The Form GS2 represents the formulation of an individual student's curriculum as approved by your Advisory Committee. It must adhere to Graduate School as well as SOC policies. Courses in excess of those required for the degree should not be listed on the Form GS2. Any questions concerning undergraduate deficiencies, transfer of graduate credit from other institutions, special program requirements, etc., should be resolved before the Form GS2 is submitted.

Advisory Committee approval of your plan of study is indicated by their signatures on the Form GS2. The form must also be approved by the School Director, and the Deans of the college and Graduate School.

You must complete any class listed on your Form GS2 before graduation; if you fail to do so, you must file a revised Form GS2. Prior to graduation, you may revise your degree curriculum as needed subject to the necessary Advisory Committee and Dean approvals. In extremely rare situations, it may be necessary to change committee membership. In either case, you must submit a revised Form GS2.

Waiver of requirements

The requirements for achieving a graduate degree in the SOC, as outlined in this handbook, are designed to provide a consistent minimum level of performance for all graduate students. At the same time, flexibility is provided to allow for the diverse areas of study and individual strengths of each student. Most of this flexibility is built into the existing requirements.

Under extreme conditions, you may petition for a waiver of requirements. Your petition must be made in writing by your Major Advisor to the GAC and must be submitted at least six (6) months prior to your expected graduation date. The GAC will not grant a waiver except in truly extraordinary circumstances.

Assistantships/Financial Support

Description of assistance available

Graduate assistantships are available in teaching and research. Graduate teaching assistantships (GTAs) include graders, laboratory assistants/instructors and teachers of record. These may be in the form of ¼-time (10 hours per week) ½-time (20 hours per week) or ¾-time (30 hours per week) appointments. Graduate research assistantships (GRAs) are generally made available by individual faculty members to conduct research on specific projects. These may also be ¼-time, ½-time, or ¾-time appointments.

Fellowships are available from organizations outside Clemson University. Information on these opportunities is available from the school and from the Graduate School website (www.grad.clemson.edu/fellowships.php).

Your responsibilities and the details of your financial support are included in your official offer letter from the School Director or the DGA. This letter requires your signature indicating your acceptance of the terms. (TAs will receive a separate communication with more detail as to their specific assignments, such as course sections, etc.) To maintain your assistantship, you must complete the duties in a satisfactory manner and make satisfactory progress toward your degree; moreover, necessary funds must be available to the SOC or to the individual faculty member in order to renew your assistantship.

Assistantship funding

The SOC uses two different sources for funding graduate students: State of South Carolina monies; and, funds from contracts, grants, and donations. Students supported by state funds normally are assigned teaching assistant duties, while those supported by research contract funds are assigned research duties. All assistantships may be subject to time limits (depending upon the degree being pursued) and are contingent upon your satisfactory performance and progress toward the degree as well as availability of funding.

Minimum enrollment

A minimum enrollment is required for appointment as a graduate assistant. During the academic year, the minimum enrollment is nine (9) credit hours for all graduate assistants. Minimum enrollment in the summer sessions is three (3) credit hours per session. Undergraduate credits may be included in the minimum provided they are relevant to your degree program and required by your Advisory Committee. Credits in GS 799 may be included in the minimum in unusual cases cleared in advance with the Graduate School.

An assistantship may be withdrawn at any time for failure to maintain satisfactory enrollment status.

Employment-related information

Income taxes

The State of South Carolina, as well as the U.S. government, levies an income tax. Therefore, as a general rule, state and federal taxes will be withheld from your pay, and you will need to file income tax returns with both the state and federal taxing agencies.

Paydays

Paydays are alternate Fridays.

Paperless pay

Stipend checks must be direct-deposited through the University system. You must fill out an “Authorization for Deposit of Net Pay” Form upon starting your assistantship. You must provide a voided check or bank account information card. This action is mandatory; there are no exceptions. Pay stubs will not be given/mailed to you, but are available electronically through MyCLE.

To view your pay stub and other employment-related information on MyCLE, go to bb.clemson.edu. Enter your *employee* ID and password in the username and password fields and click “Login”. (If you do not know your employee user ID, you can obtain it by presenting a photo ID at a CCIT Help Desk.) Then select “View Paycheck” from the CU Faculty & Staff Resources list. Re-enter your employee ID and password to sign in to PeopleSoft. Your most recent pay stub will appear.

Work injury protocol

Should you be injured during the course of your employment responsibilities, you must immediately report the injury to your supervisor. Your supervisor should then immediately call the workers’ compensation insurance company. Their medical manager will gather information about the accident and direct you to a healthcare facility or physician for treatment. No coverage will be provided for work-related claims unless reported by your supervisor before you receive medical treatment at the authorized provider.

In the event of severe injury/emergency, call 911 first, and then execute the above procedures.

Workload

The normal ½-time graduate assistantship workload is 20 hours per week (average). Students are sometimes hired for 25% (10 hours), 37.5% (15 hours) and 75% (30 hours) of full-time work, under appropriate circumstances. You should be aware of both your academic and work obligations, and are encouraged to discuss any problems with faculty. International students should note that immigration laws place limits on the number of hours employed during the academic year. See gradspace.editme.com/financialInformationIndex for more information.

Work product

Computer programs written, data generated, discoveries made, derivations developed, etc., in the course of your assistantship are the property of Clemson University.

Reduction of pay

Normally, your agreed-upon workload will be submitted as hours worked for each payroll period. However, if the amount of work you perform consistently deviates below the required workload, your pay will be reduced accordingly. Due to the procedure in which time sheets are currently used, it may be necessary to implement any pay reductions in the pay period following the one in which the work deficiency actually occurred. Pay also may be withheld from students who violate the vacation policy (see below).

Vacation policy

As a rule, graduate assistants do not accrue paid vacation time. Your work timeframe should not be perceived to be the same as the semester class schedule. Generally, graduate assistants work on the same calendar as faculty with 12-month appointments unless different work expectations are distinctly articulated in your offer letter. In the event of a death in your immediate family, illness of a close family

member or personal illness or hardship, you may request up to four weeks leave without pay per semester and one week of leave without pay per summer session from your immediate supervisor.

Military leave policy

The Graduate School has ruled that a graduate student on military leave, for example summer camp, will not receive a stipend for the period of that leave. Students planning to take military leave should notify the departmental secretary of the inclusive dates. Short periods of about one week can be taken as regular vacation with no interruption in pay. Students leaving the campus for six weeks to attend summer camp must obtain written permission from the dean of the Graduate School to be excused from the continuous enrollment provision.

Holidays

Graduate students are entitled to take as holidays the days on which the University is officially closed. See the official University holiday schedule at www.clemson.edu/cao/humanresources/benefits/holiday.html.

Termination of pay

Pay for any session will end when you leave Clemson or are no longer available for work assignments. Normal termination dates for the spring and fall semesters for students not continuing into the next session is graduation day. Any deviations from these dates must be approved by your Major Advisor or the DGA.

Process and Procedures

See [Appendix A](#) for a complete list of courses and their official descriptions. Note that instructors have leeway in modifying the course and content.

School and Graduate School forms

You will be required to complete the following forms through the course of your studies. Up-to-date versions of the Graduate School forms are available at www.grad.clemson.edu/forms/forms_current.php; however, note that most of the Graduate School forms are prepared in the SOC by the SSGPC and not the student. School forms are available from the magazine rack outside McAdams 110.

Forms to Complete in the School of Computing			
<u>Form ID</u>	<u>Required By</u>	<u>Approximate Deadline*</u>	<u>To be Signed By</u>
GS2 – Plan of Study	Graduate School	Middle of 2 nd semester for M.S.; by the end of the 3 rd semester for Ph.D.; any final changes are due by end of semester prior to graduation	Advisory Committee members, School Director, dean of college (Prepared by the SSGPC)
GS5 – Admission to Doctoral Candidacy (for Ph.D. students only)	Graduate School	At least six (6) months prior to graduation	Advisory Committee members (Prepared by the SSGPC)
Dissertation Proposal Preparation & Presentation	School of Computing	Must be in 15 days before the presentation to the SSGPC	Advisory Committee members
GS4 - Diploma Application	Graduate School	Within first four weeks of semester in which you will graduate	Online submission — user ID required
Colloquium Preparation & Presentation Form	SOC	Must be in 15 days before the presentation to the SSGPC	Advisory Committee members (Colloquium notice prepared by the SSGPC)
GS7 – Final Comprehensive Exam and Thesis/Dissertation Approval Form	Graduate School	Two weeks prior to graduation	Advisory Committee members (Prepared by the SSGPC)

* See specific deadline dates for Graduate School forms at www.grad.clemson.edu/Deadlines.php.

Sample timetables of student progress

The following table lays out a typical progression through the SOC program.

A Sample Master's Program of Study	
Year 1 – 1 st Semester	Take 3 graduate courses, attend seminars, attend faculty research presentations, choose a Major Advisor.
Year 1 – 2 nd Semester	File GS2 form. Take 3 graduate courses, attend seminars, and begin work on research project if in thesis option.
Year 2	Take 2 more graduate courses (or more as needed/desired), attend seminars, and continue working on research project. Present seminar and write and defend thesis if research is completed.
Year 3 or more (if needed)	Take more graduate courses as needed/desired, attend seminars, continue working on research project, present seminar and write and defend your thesis when research is completed.

A Sample Ph.D. Program of Study	
Year 1 – 1 st Semester	Take 3 graduate courses, attend seminars, and attend faculty research presentations.
Year 1 – 2 nd Semester	Take 3 graduate courses, attend seminars, and begin work on research project.
Year 2 – 1 st Semester	Take more graduate courses, attend seminars, choose a Major Advisor, and write research paper for Portfolio. File GS2 form.
Year 2 – 2 nd Semester	Take more graduate courses, submit Portfolio.
Year 3	Define research project with advisor and submit proposal.
Year 4 and beyond	Continue working on research project. Take more graduate courses as needed/desired, attend seminars. Write and defend your dissertation when research is completed.

Checklist/worksheet of requirements

Use the following checklist to track your completion of program requirements.

Checklist for Master's Students in the School of Computing			
<u>What</u>	<u>When to Complete</u>	<u>How/Who</u>	<u>Date Completed</u>
Selection of a Major Advisor / Advisory Committee / Plan of Study	By the start of your second semester	Form GS2	

Formal Plan of Study (GS2)	By the end of your second semester	SSGPC, who routes to Enrolled Services	
Minimum of 30 credit hours completed	Within six calendar years prior to graduation	Form GS2	
Apply for diploma	Beginning of final semester*	You fill out online via iROAR	
Order cap and gown	Beginning of final semester	You order through bookstore	
Submit Dissertation Proposal Preparation & Presentation Form	At least 15 days prior to defense	Form Filed / SSGPC	
Submit your thesis	1 st draft several weeks before date of final exam; final (approved) copies at least 2 weeks prior to exam	You supply to your Major Advisor and Advisory Committee	
Final Examination	At least 3 weeks prior to graduation*	Major Advisor files GS7 with SSGPC, who routes to Graduate School	
Submit your manuscript to Graduate School for formatting review	At least 2 weeks prior to graduation* (earlier is better)	You submit online via www.grad.clemson.edu/manuscript.php	
All formatting revisions completed, approval of manuscript by Graduate School	At least one week prior to graduation*	Via e-mail and website; the manuscript review office will notify you of any revisions required and how to submit them	

* See specific deadline dates for Graduate School forms at www.grad.clemson.edu/Deadlines.php.

Checklist for Doctoral Students in the School of Computing			
<u>What</u>	<u>When to Complete</u>	<u>How/Who</u>	<u>Date Completed</u>
Selection of a Major Advisor / Advisory Committee / Plan of Study	By the start of your second year	GS-2 / DGA	
Formal Plan of Study (GS2)		SSGPC, who routes to Enrolled Services	
Minimum of 12 course credit hours completed, exclusive of research	Within six calendar years prior to graduation	Form GS2	

Portfolio	After completion of core courses	GAC	
Admission to doctoral candidacy	Upon completion of Portfolio Review and at least six months prior to graduation	Form GS5 / GAC	
Submit Dissertation Proposal Preparation & Presentation Form	At least 15 days prior to proposal presentation	File Dissertation Proposal Preparation & Presentation Form / SSGPC	
Approval of dissertation proposal	Within approximately one year of completing core courses	Advisory Committee signs proposal; you file proposal with SSGPC	
Minimum of 18 credit hours of doctoral research completed	At least six months prior to graduation		
Apply for diploma	Beginning of final semester*	You fill out online via iROAR	
Order cap and gown	Beginning of final semester	You order through bookstore	
Submit your dissertation – 1 st draft	At least 8 weeks before date of final examination	You supply to Advisory Committee members	
Submit GF-3	At least 15 days prior to defense	File GF-3 / SSGPC	
Submit your dissertation – final	Approved copies at least 2 weeks prior to final examination	You supply to Major Advisor and Advisory Committee members	
Dissertation Defense (Ph.D. Final Examination)	At least 3 weeks prior to graduation*	Major Advisor files GS7 with SSGPC, who routes to Enrolled Services	
Submit your completed manuscript to Graduate School for formatting review	At least 2 weeks prior to graduation* (earlier is better)	You submit online via www.grad.clemson.edu/manuscript.php	
All formatting revisions completed, approval of manuscript by Graduate School	At least one week prior to graduation*	Via e-mail and website; the manuscript review office will notify you of any revisions required and how to submit them	

* See specific deadline dates for Graduate School forms at www.grad.clemson.edu/Deadlines.php.

Guidelines for faculty

Major Advisor

You, the student, have primary responsibility for ensuring that you meet all requirements; your Major Advisor is responsible for ensuring that you have met that responsibility. Your Major Advisor will present any requests for a waiver of a requirement to the faculty for approval.

Director of Graduate Affairs

The DGA also ensures that requests for waivers from the guidelines are presented to the faculty in a timely manner, judges matters of course equivalence, and serves as an intermediary during challenges by the faculty of a graduate student's program or performance.

Principal Investigator

The Principal Investigator (PI) in a research project must identify any circumstances under which a particular laboratory, field operation, procedure or activity requires prior approval, and must submit a research protocol if needed. The PI is also responsible for ensuring that all University and department safety regulations and protocol standards are met. This responsibility includes sufficient supervision of students and technicians to ensure adherence to these standards.

General faculty

The faculty of the SOC will determine the guidelines for all graduate degree programs. The faculty may amend the guidelines for the graduate degree programs by a simple majority of those voting; all faculty will be polled. SOC faculty also have the authority to approve or reject candidates for graduate degrees. Any concern by individual faculty members about a student's plan of study or conduct in the program should be presented to the DGA as soon as possible. The DGA will communicate any concerns to the student's Major Advisor for possible action. If the faculty member who raised the concern still wishes for the matter to be considered by the full faculty, the DGA will bring the matter before the faculty at a regular meeting.

Professional Development

There are a number of opportunities for you to develop professionally in addition to your coursework and research. These include presenting talks and/or posters at regional and national conferences, becoming a student member of professional organizations, and preparing for your eventual job search.

Career planning

The Michelin Career Center provides information about market conditions and gives assistance in acquiring knowledge about your career opportunities and job requirements. The Center hosts career fairs each fall and spring, and offers workshops in a variety of career-related topics. The Center also provides information about internships and part-time and summer work. For more information, see their website at career.clemson.edu or call (864) 656-6000.

Student government

The Graduate Student Government (GSG) represents the interests of all graduate students at Clemson. Generally the GSG promotes student participation in University affairs and learning experiences. It also elects representatives to various University boards and committees. Participation in the GSG can provide valuable leadership experience. See www.clemson.edu/~gsg.

Administrative Policies & Procedures

Harassment

It is the policy of Clemson University to conduct and provide programs, activities, and services to students, faculty, and staff in an atmosphere free from harassment. Harassment is unwelcome verbal or physical conduct, based upon race, color, religion, sex, sexual orientation, gender, national origin, age, disability, status as a military veteran, or protected activity (e.g., opposition to prohibited discrimination or participation in the statutory complaint process), that unreasonably interferes with the person's work or educational performance or creates an intimidating or hostile work or educational environment. Examples may include, but are not limited to, epithets, slurs, jokes, or other verbal, graphic, or physical conduct.

Harassment of University faculty, staff, students, or visitors is prohibited and shall subject the offender to appropriate disciplinary action, including dismissal from the program.

Employees or students who feel they are victims of any form of discrimination are encouraged to consult the Office Access & Equity (E-103 Martin Hall, (864) 656-3181) for advice and assistance in resolving complaints.

In the event a graduate student wishes to appeal the resolution of the Office of Access & Equity, the student must submit a written request for an appeal to the Dean of the Graduate School, who in turn will convene an ad hoc committee that will review the process and/or sanction. The committee membership will come from faculty and students already appointed to the Graduate Council.

Sexual harassment

Title VII of the Civil Rights Act of 1964, as amended, provides that it shall be unlawful discriminatory practice for any employer, because of the sex of any person, to discharge without just cause, to refuse to

hire, or otherwise discriminate against any person with respect to any matter directly or indirectly related to employment. Harassment of any employee on the basis of sex violates this federal law. The Equal Employment Opportunity Commission has issued guidelines as to what constitutes sexual harassment of an employee under Title VII.

Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when any of the following occurs:

1. Submission to such conduct is made explicitly or implicitly a term or condition of an individual's employment or academic standing;
2. Submission to or rejection of such conduct by an individual is used as a basis for employment or for arriving at academic decisions affecting an individual;
3. Such conduct unreasonably interferes with an individual's work or academic performance, or creates an intimidating, hostile or offensive working or academic environment.

Sexual harassment of University faculty, staff, or students is prohibited and shall subject the offender to dismissal or other sanctions after compliance with procedural due process requirements. In the event a claim of sexual harassment arises, the claimant may use University grievance procedures that have been established for faculty, staff, and students as appropriate. This policy also prohibits an employee from sexually harassing a superior and a student from sexually harassing a faculty member.

Amorous relationships

Amorous relationships that might be appropriate in other circumstances can be inappropriate when they occur between a faculty member, officer, or supervisor of the University, and any student or subordinate employee for whom he/she has a professional responsibility.

Those in positions of authority inherently carry the element of power in their relationships with students or subordinates. It is imperative that those with authority neither abuse, nor appear to abuse, this power entrusted to them.

Officers, supervisors, and members of the teaching staff should be aware that any romantic involvement with a student or subordinate employee could make them liable for formal action if a complaint is initiated. Even when both parties have consented to such a relationship, it is the officer, supervisor, or faculty member who may be held accountable for unprofessional behavior. Difficulties can also arise from third parties who may feel that they have been disadvantaged by such relationships. Graduate assistants, research assistants, tutors, and teaching assistants who are professionally responsible for students would be wise to exercise special care in their relationships with students they instruct or evaluate.

Any questions concerning these statements or Clemson University's Policy on Sexual Harassment should be directed to the Office Access & Equity (E-103 Martin Hall, (864) 656-3181).

Drugs, alcohol, smoking

Drugs

The use, possession, distribution, or dispensation of illegal drugs is strictly prohibited. Violation could result in your dismissal from the University.

Alcohol

Alcoholic beverages are prohibited for any activity held in any College of Engineering and Science (CoES) facility.

Smoking

In the interest of the safety and health of all the occupants of our buildings, no smoking is allowed in any classroom, hallway, laboratory, office, or other public spaces. This rule is necessary not only for health reasons but also for general building safety.

E-mail access, use

E-mail is the official mode of communication used by the SOC and the University to communicate with you. Many events and information of importance to your success in the program are announced via e-mail. You are responsible for announcements, inquiries, requests, etc., made by e-mail from all representatives of the school. It is very important that you check your e-mail regularly, at least twice a day (early morning and late evening). If you are requested to respond, you should do so in a timely manner. Being unaware of an e-mail message is not an acceptable excuse.

Note that if you have an assistantship, you will have a student and an employee university e-mail account, and you will be responsible for checking both on a regular basis.

Mailboxes and personal mail

Each graduate assistant is assigned a mailbox, which you should check regularly.

All personal mail is to be directed to your home address. The SOC is not to be used as your mailing address. The SOC assumes no responsibility for personal deliveries to McAdams Hall.

Outgoing mail, both U.S. and campus mail, can be placed in the appropriate receptacles in the SOC's mailroom. You must provide adequate postage for any U.S. mail. International mail must be taken to the U.S. Post Office.

Intra-department communications

Notices of interest to graduate students will be posted in the department or, on occasion, mailed directly to you. Notices will be posted in the Graduate Student Lounge or in the McAdams 110 lab. To ensure receipt of any school mailings, you should have a current address and telephone number on file with the SSGPC.

Card Access/Combinations/Keys

You will be issued card access or a combination to your office or research area and card access to the building. Access to specific research laboratories will be issued upon obtaining permission from the faculty member in charge of the lab.

The card access and/or combinations issued to you are for your use exclusively. You must never give either to anyone else, not even another graduate student. Failure to observe this rule may result in revocation of your access privileges. Unauthorized access to a University building is prohibited by South Carolina law.

You are responsible for locking all rooms to which you have gained access.

Building security, maintenance

McAdams Hall is normally locked at night on weekdays, and throughout weekends. As you enter and leave the building, if it is locked, be sure that all doors are locked behind you. During the work week, the front and side doors on the first level are normally unlocked. Never prop a door open with a rug, chair, stick, etc.

On football weekends the building will be locked; however, card access is available. Persons entering or leaving McAdams Hall on those days should check to make sure door closes and locks behind them. If the door doesn't close and lock, call the CUPD at 656-2222 and report it.

Copy machine use

In general, the copy machine may not be used by graduate students. Copy machines may be found in the library, or you may have copies made in the Hendrix Student Center for \$0.25 each or Cooper Library for \$0.10 each.

Fax machine use

In general, the SOC's fax machine may not be used by graduate students. Personal transmissions may be sent at the Student Union or other locations in downtown Clemson.

Telephone use, long distance charges

Your use of office telephones must be restricted to business use and emergencies during business hours. You must inform your friends and family not to call you on the office phones on routine matters.

Office supplies

In general, the SOC does not issue office supplies to graduate students.

Ordering supplies and equipment

If you order equipment or supplies without the permission of your Major Advisor or the School Director, you will be responsible for paying the bill. In addition, students placing orders are responsible for being cognizant of state purchasing regulations, and may be liable for paying the bill in the event of violations. Also, whenever possible you are to use the Clemson University buyWays system. The URL for the buyWays system is:

<https://solutions.sciquest.com/apps/Router/Login?OrgName=Clemson&tmstmp=1219256901600>. When placing orders over \$2,500 (total of the entire purchase — not per item — including tax, shipping and handling), whether over the phone or purchased in town, you *must* obtain an order number from the administrative assistant prior to making the order or purchase.

Supplies will normally be delivered to 100 McAdams Hall. When they are checked in, a copy of the packing list will be placed in the package and your name will be placed on the outside. If the contents do not match the packing list, notify the administrative assistant ASAP. Do not pick up any box that has not been checked in.

Recycling

Faculty, staff and students, out of a spirit of environmental sensitivity, collect and recycle white paper and cardboard. Recycle containers are located in various areas of the building. White paper waste is stored in marked containers. The recycling containers will be checked several times monthly to ensure that all is well and to determine whether the storage containers have filled faster than normal. If you encounter a full container, please contact Recycling Services at (864) 656-2040.

Student offices/desks

It is the goal of the SOC to provide a desk for each GTA. New teaching assistants should see the Office Manager concerning a desk assignment.

Access to school files

All SOC files are off limits unless you have express permission to use them. Contact the SSGPC should you need information from a school file.

Administrative suite

Graduate students should not enter the Administrative Suite except upon official business.

Faculty offices

Faculty members carry out numerous duties, of which teaching and research are but two. Please observe faculty office hours when posted and arrange appointments in advance whenever possible. Do not enter a faculty member's office unless invited to do so.

Student travel

The complete Guidelines Index, including authority references and guidelines specific to University administration, is available at www.clemson.edu/cfo/procurement (CU Dept Info, Travel Guidelines). Direct any questions regarding travel to the administrative assistant in 103 McAdams Hall.

Support Services

Grievance policy and ombudsman information

It is the policy of the Graduate School to address all grievances of an academic nature filed by enrolled graduate students. Graduate student grievances are heard by the Graduate Academic Grievance Committee (GAGC). The GAGC typically consists of three faculty representatives from each of the five colleges and one graduate student representative from each college. A six-member Initial Grievance Review Board (IGRB) is formed from among GAGC members and is responsible for determining which grievances will go forward to the GAGC.

Procedure

Grievances must be filed with the Graduate School within 60 days of the alleged act and may involve the following: violations of program, department, college, or Graduate School policies related to final grades

in courses or research (891 or 991); violations of program, department, college, or Graduate School policies related to the completion of any academic requirement including theses and dissertations, and oral or written comprehensive examinations; and, graduate student assistantship employment including offers of assistantship appointments made during recruiting not honored after enrollment.

At any time prior to filing a grievance, the student may consult with the University Ombudsman charged with mediation in cases involving graduate students.

Any student wishing to file a complaint must first make every attempt to resolve it within the SOC and then the CoES. The student must first take the complaint to the faculty or staff member(s) involved. If no resolution can be reached, the student should request assistance from the School Director and the Dean of the college.

If the grievance remains unresolved, the student may file the complaint with the Graduate School. The student must first meet with the associate dean of the Graduate School charged with oversight of the GAGC. The associate dean will describe the grievance process to the student. If the student wishes to proceed with the grievance, the associate dean will provide the student with Graduate School Form GSg-A, "Request to File a Grievance," which will enable the student to provide a written statement detailing the issue and his or her attempts to resolve it at the college level by documenting a) the dates of consultations at the college level, b) the names of those persons consulted, and c) the signature of the collegiate dean attesting that no resolution could be reached. The student must return the fully executed Form GSg-A to the Graduate School within 30 days of receipt from the associate dean. Students who fail to file the grievance within this timeframe forfeit their opportunity to proceed.

The student may seek external counsel (an advisor, an attorney, etc.) to assist with preparation of materials to submit to the GAGC. The student may request such individuals accompany him or her to the hearing and may wish to proceed to prepare for this event. Questions concerning possible impacts on the student's graduate status should he or she not be successful in the grievance may be discussed at this time with the associate dean of the Graduate School.

The IGRB will determine if the complaint, as submitted on Form GSg-A constitutes a grievance under the Graduate School's policies. Grievable complaints will be addressed by a subcommittee of the GAGC appointed for the purpose of addressing the complaint in question. The subcommittee will convene an informal, closed hearing to recommend a resolution to the grievance. For more information about the procedures, refer to the *Graduate School Announcements* at www.registrar.clemson.edu/html/catalogGrad.htm.

University Ombudsman

The ombudsman is an independent, confidential resource that provides assistance to faculty, graduate students, and post-doctoral students in resolving problems, complaints, and conflicts when normal processes and procedures have not worked satisfactorily. The Ombudsman's Office serves as a central information source on policies, procedures, and regulations affecting faculty, graduate students, and post-docs. The office refers individuals to persons able to resolve problems or handle appeals at the lowest possible level. Where appropriate, the ombudsman can facilitate and/or mediate communication between parties who find themselves in a dispute.

The ombudsman strives to ensure that faculty, graduate students, and post-docs receive fair and equitable treatment within the University system. He or she provides an independent point of view in an informal and confidential environment. The ombudsman will not identify you or discuss your personal concerns with anyone without your permission. Private confidential meetings can be arranged at your convenience. All communications will be treated with strict confidentiality. The ombudsman works toward resolutions

based on principles of fairness. He/she is neither an advocate for faculty, administration, or students, nor an agent of the University, but is an advocate of fair processes.

The Office of the Ombudsman provides fair and impartial counseling to faculty members, graduate students, and post-docs by: 1) addressing problems and concerns, and identifying and evaluating options to reach resolutions; 2) providing available resources within the University, particularly as to policies and procedures; 3) serving as a neutral party in conflict resolution; 4) opening lines of communication through mediation; and 5) recommending changes in University policies and procedures when necessary. The ombudsman assists in issues of harassment, academics, unfair or inequitable treatment, or any other University policy that you feel has been applied unfairly or erroneously.

The ombudsman, as a designated neutral party, has the responsibility of maintaining strict confidentiality concerning matters that are brought to his/her attention unless given permission to do otherwise. The only exceptions, at the sole discretion of the ombudsman, are where there appears to be imminent threat of serious harm. The ombudsman must take all reasonable steps to protect any records and files pertaining to confidential discussions from inspection by all other persons, including management.

The ombudsman will not testify in any formal judicial or administrative hearing about concerns brought to his/her attention. When making recommendations, the ombudsman has the responsibility to suggest actions or policies that will be equitable to all parties.

Concerns can be directed to the University Ombudsman by letter, walk-in, appointment or telephone: R. Gordon Halfacre, University Ombudsman for Faculty and Graduate Students and member of the Ombudsman Association, 101 Clemson House; telephone (864) 656-4353 or (864) 656-4957; e-mail ombudsman@clemson.edu.

Counseling services

The demands of graduate school can sometimes seem overwhelming. If you feel you could benefit from talking to a counselor — about grad school stress or any other issue — you may be eligible to receive services from the Counseling and Psychological Services program (CAPS), located in Redfern Health Center. To learn about their current programs, visit the CAPS website at www.clemson.edu/campus-life/campus-services/redfern/mental-health or call them at (864) 656-2451.

Graduate Student Government

The Graduate Student Government (GSG) is a University-wide organization of all graduate students for promoting graduate student interests. At the start of each fall semester, departmental GSG representatives are elected. The biweekly senate meetings are open to all graduate students. See the *Graduate School Announcements* (www.registrar.clemson.edu/html/catalogGrad.htm) for more information, or contact the GSG office at (864) 656-2697. Your active participation in GSG is encouraged.

Computer Science Graduate Student Association

The Computer Science Graduate Student Association (CSGSA) is an organization dedicated to serve the graduate students of the School of Computing and to promote their interests. CSGSA represents graduate students on various committees in the SOC and in the university, including a Graduate Student Liaison who meets with the SOC's GAC. For more information you can visit CSGSA at csgsa.cs.clemson.edu.

Association for Computing Machinery

Clemson's Student Chapter of the ACM is attempting to "break the mold" of Computer Science student organizations by having a club with both social and professional interests in the field of computing. Their social activities and professional opportunities include helping students to get to know his or her fellow students as well as obtain a greater knowledge of the field of computing. For more information visit ACM at www.cs.clemson.edu/~acm/.

Upsilon Pi Epsilon

Upsilon Pi Epsilon (UPE) is an international honor society for Computing Sciences. It was founded in 1967 by six (6) students at Texas A&M University. It is the first and only international honor society for the Computing Sciences. UPE is an independent organization which is recognized by the ACM (1967) and the IEEE-CS (1992) as an official honor society. For more information visit UPE at www.cs.clemson.edu/group/upe.

Clemson Linux Users Group

Clemson Linux Users Group (C.L.U.G.) is an organization dedicated to promoting the use of Linux and other free software at Clemson. C.L.U.G. holds two or more install-fests each semester along with its regular biweekly meetings, and the group provides a Linux learning wiki and other user support via web forums and IRC. For more information, see <http://clemsonlinux.org>.

Women in Science and Engineering

Women in Science and Engineering (W.I.S.E.) is an organization at Clemson University designed to help and support females in engineering and science majors. From mentoring and networking to test banks and tutoring, W.I.S.E. offers unlimited resources and information. For more information visit W.I.S.E at www.ces.clemson.edu/wise/.

School of Computing Alliance

The School of Computing Alliance (SoCA) is an organization in the SOC that seeks to promote academic excellence, social justice, and unity through community among underrepresented racial ethnic students in computer science. The organization, formerly known as the Computer Science African American Alliance (CS AAA), has been active in mentoring elementary children, hosting community events with a focus on the family, and sponsoring racial ethnic speakers to Clemson's campus such as Dr. Bernard Harris (first African American to walk in space) and Dr. Essie Mae Washington-Williams (African American daughter of Senator Strom Thurmond). Through the organization, Dr. Washington-Williams' papers were donated to the Strom Thurmond Institute for posterity. Moreover the organization seeks to strengthen and encourage underrepresented racial ethnic students, and others who ascribe to their constitution and by-laws, to become successful computer scientist and productive citizens.

Campus Facilities and Resources

Emergencies

Call the Clemson University Police Department ((864) 656-2222) for all major emergencies: fire, medical, police. They will ensure that the proper authorities are dispatched. For minor emergencies after hours, call Dr. Wayne Madison at (864)-654-6621.

- In case of fire, exit the building immediately. Use stairwells; do not use the elevator.
- In case of tornado warning, seek shelter in the interior hallways and interior rooms on the first floor. Stay away from windows. Use stairwells; do not use the elevator.

Campus shuttle bus

Clemson University supplies a shuttle bus to transport students between the main campus and the Research Park during fall, spring, and summer semesters. Trips are scheduled from 7 a.m. until 6 p.m. Monday through Friday (except during holidays and Fall Break). The shuttle makes one trip per hour from the Hendrix Center to the Research Park. The shuttle leaves the Hendrix Center on the hour and arrives at the Research Park at approximately 20 minutes after the hour. Stops are at AMRL, Rich Lab, and Ceramic and Materials Lab.

R.M. Cooper Library

Located on campus adjacent to the reflecting pool, the main library houses more than 1.5 million items, including books, periodicals, and microforms. Periodicals can be checked out for a maximum of three days (\$1/day late fee) while books can be checked out for six weeks (\$0.25/day late fee). The catalog is online and can be accessed from any campus computer. Free online literature searches can be conducted at the main library; an appointment must be made to complete the online search. In addition, the library contains a number of computers and printers as well as copiers, two of which are located in the reference area, and several of which are located on the ground floor. Additionally, there is a coffee shop and convenience store located within the library. For more information about the library, call (864) 656-3024 or the Library Hours Hotline at (864) 656-3027.

The library also has two satellite branches. The Emery A. Gunnin Architectural Library, located in Lee Hall, provides materials on architecture, visual arts, city and regional planning, building science and constructions, and landscape architecture. Its extensive slide library can also be helpful to those interested in history, art, etc. The library's Special Collections Unit, housed in the Strom Thurmond Institute building, contains rare books, manuscripts of prominent South Carolinians, and materials relating to the history of Clemson University and South Carolina. A smaller, specialized collection is also located in the Chemistry Library in Hunter Hall.

Copy services

Copiers are available in the Cooper Library on various levels. They are coin operated and cost 10¢ per copy. (If you use your Tiger Stripe Card in the copiers, the copies cost only 5¢ per copy.) Student Services also provides copiers at the Manning Hall Lobby, Calhoun Courts Commons Building basement, and the Student Government Complex.

The Union Copy Center, located on the first floor of the Hendrix Center, provides self-service and counter services to students. For more information and hours, call (864) 656-2725.

The Campus Copy Shop located at One Rubin Square, 384 College Avenue, between Hallmark and Peppinos Pizza, offers self-service copiers. They also do full laser copies, engineering copies, blue-prints, binding, passport photos, lamination, reductions and enlargements, resumes, PMTs, typesetting, etc. They also may be a pickup location for course notes. For more information and hours, call (864) 654-3863.

University Union, Hendrix Student Center, and Brooks Center

The Edgar Brown University Union, the Hendrix Student Center, and the Brooks Center for Performing Arts provide social, educational, cultural, and recreational activities for members of the University and larger community. Hundreds of varied activities are offered to the campus community each year, including films, videos, concerts, bands, comedy and variety acts, short courses, speakers, game tournaments, cultural arts performances, outdoor recreational trips, group travel, and special events.

University Bookstore

The University Bookstore is located on the first floor of the Hendrix Student Center. It stocks all required textbooks and supplies as specified by the various departments, as well as general trade books, greeting cards, computer software, personal care items, etc. The bookstore holds textbook buy-back year-round. The bookstore accepts VISA, MasterCard, and Tiger Stripe. The bookstore also allows students to buy their books on-line: www.clemson.edu/bookstore. Graduate assistants and teaching assistants may be eligible for discounts at the University Bookstore.

University Health Services

The Redfern Student Health Center on campus provides health services to University students. Redfern offers a variety of services including: outpatient ambulatory care for illnesses and injury, health education on women's health issues, nutritional counseling, dermatology, and orthopedic clinics. Students are seen at Redfern throughout the day by appointment. A walk-in clinic is available to students who do not have an appointment. ASK-A-NURSE telephone services are also available.

If you have questions about services provided, call Redfern Health Center at (864) 656-2233; if you would like to schedule an appointment to see a doctor at Redfern, call the appointment line at (864) 656-1541. For service hours or other information, see their website at www.clemson.edu/redfern/.

Fike Recreation Center

Graduate students may use these facilities. Lockers are available at the recreation center. For specific information about the facilities and activities offered, visit www.clemson.edu/campusrec/facilities.

Sporting events

Graduate students may purchase season tickets for Clemson football and basketball games. If interested, you should inquire at the IPTAY ticket office (Gate 9, Memorial Stadium) to complete an application. Further information can be obtained from the ticket office ((864) 656-2118). Baseball games are free with University ID. Tickets for soccer games may be purchased at the gate (usually \$3 with University ID).

Campus parking

Parking on campus is restricted and requires a permit that can be purchased at Parking Services located on the ground level of the Edgar Brown University Union ((864) 656-2270) or via their website at www.clemson.edu/parking.

NEARING GRADUATION

Graduate School Deadlines

The Graduate School sets deadlines for the following items. The specific dates are determined according to the academic calendar for the semester in which you plan to graduate.

Form/process	Approximate deadline*
Submit your final GS2 to Enrolled Services (Processed by the SSGPC)	End of the term prior to the term in which you plan to graduate
Submit GS5 to Enrolled Services (Processed by the SSGPC)	Six months prior to defense (SOC students do not prepare and submit GS5 forms directly)
Complete online application for diploma (formerly Form GS4)	Within the first four weeks of the term in which you will graduate
Written notification of defense submitted to Enrolled Services (Processed by the SSGPC)	At least 10 days prior to your defense (Internal form to SSGPC at least 15 days prior to your defense)
Submit completed thesis/dissertation electronically for formatting review	Two weeks prior to graduation
File GS7 with Enrolled Services (Processed by the SSGPC)	Two weeks prior to graduation (SOC students do not prepare and submit GS7 forms directly)
All revisions requested by the Manuscript Review Office must be completed and approved by the Manuscript Review Office	One week prior to graduation

*Refer to the Graduate School's website for actual deadline dates (www.grad.clemson.edu/Deadlines.php). All Graduate School forms are available online at www.grad.clemson.edu/forms/forms_current.php. NOTE: Graduate School forms are processed in the School by the SSGPC, after receiving the School's GF form. Also be aware that some deadlines may be slightly different in the School to allow for the timely processing of required paperwork.

Thesis/Dissertation

The purpose of a thesis or dissertation is to demonstrate your capability to:

- Formulate a research problem;

- Demonstrate knowledge relevant to a meaningful resolution of a specific problem;
- Effectively plan the work leading to the completion of the problem;
- Report the results of your research in concise, precise professional style.

General guidelines

All theses and dissertations shall be prepared in accordance with guidelines established by the Graduate School (see www.grad.clemson.edu/Manuscript.php). This guide provides advice on preparing an acceptable and effective thesis or dissertation. You should consult this guide before beginning the writing phase of your graduate research. Pay particular attention to formatting requirements.

For assistance in preparing theses and dissertations the Graduate School offers an MS-Word template (www.grad.clemson.edu/Manuscript/New%20Manuscript%20Template.doc) and the CSGSA offers LaTeX macros (csgsa.cs.clemson.edu/resources/).

Planning

Task planning is a very important part of any research program. The deadlines for the tasks depend on the date of anticipated graduation and are presented in the *Graduate School Announcements*. A list of the deadlines is also available from the Graduate School website, www.grad.clemson.edu/Deadlines.php. Failure to meet any of these deadlines will result in postponement of your graduation.

You must allot sufficient time for writing the thesis or dissertation. It is highly recommended that you fully complete your thesis or dissertation before leaving the University. Many former students who left without completing their thesis or dissertation still have not completed their degree requirements. Experience shows it is very difficult to complete a thesis or dissertation after leaving the University.

Library/listing/archives of previous manuscripts

Prior students' manuscripts are available for your review. You can find them available on-line at <http://etd.lib.clemson.edu/?type=Department&inst=Computer Science&page=1>. Many faculty members also maintain copies of manuscripts of students for whom they served as Major Advisor. Your Advisory Committee members may be able to direct you toward pertinent examples for your review.

Writing the thesis or dissertation

The writing process usually begins toward the end of the research period. The document must be written in a format that is acceptable to the Graduate School for theses and dissertations. You should follow the formatting rules provided by the Graduate School at www.grad.clemson.edu/Manuscript.php. The Graduate School's manuscript website provides examples of properly formatted pages, tables, and figures. You can format the document yourself or hire someone to do this for you. It typically takes anywhere from 10-30 hours to format a manuscript at a cost of \$10 to \$20 an hour. The Graduate School's website offers a list of typists available in the Clemson area.

Review and approval

You should normally complete a final draft of your manuscript for your Major Advisor's approval at least three to four (3-4) weeks before your oral examination/defense. Final copies of a version approved by your Major Advisor must be submitted to your Advisory Committee at least two (2) weeks before your

defense. It is within the rights of any committee member to refuse to meet for your defense if they have not been given the two-week review period. Your final examination must be administered at least three (3) weeks prior to the date on which your degree is to be conferred.

As you near completion of your thesis/project/dissertation, you must defend your work to your Advisory Committee in a formal setting. The actual structure and content of your defense is determined by your Major Advisor.

As a result of their review of the written document and your oral examination/defense, your Advisory Committee may require that you do more work. After completion of that work and a successful final oral examination, your Advisory Committee will provide any comments or corrections that you must make to your manuscript. After you make the corrections, you must submit your manuscript electronically to the Graduate School for formatting review (see below).

Formatting guidelines and electronic submission

Once you have defended your thesis/dissertation, you must submit it electronically to the Manuscript Review Office of the Graduate School for formatting review. The Graduate School enforces specific formatting guidelines to ensure that your manuscript is considered credible and professional. Templates, examples, and specific guidelines are provided on the Graduate School website (www.grad.clemson.edu/manuscript) to assist you in formatting. You will not be allowed to graduate until the Manuscript Review Office has approved your final manuscript.

The Manuscript Review Office uses an electronic thesis/dissertation submission process (ETD). Hard-copy (i.e., paper) manuscripts will *not* be accepted. Not only does this process make your manuscript more accessible, but it also costs you much less due to the minimization of printing costs.

For more information about ETD and the formatting process, see www.grad.clemson.edu/manuscript.

Patent, copyright/publishing information

Clemson University and the School of Computing retain full ownership rights to any inventions, discoveries, developments, and/or improvements, whether or not patentable (inventions), which are conceived, developed, or reduced to practice, or caused to be conceived, developed, or reduced to practice by graduate students during the course of their research activities conducted as part of any Graduate School curriculum. Any such invention will be handled by the University in the same manner as set forth in The Faculty Manual of Clemson University (www.clemson.edu/faculty-staff/faculty-senate/manuals.html).

You will retain copyright ownership of your thesis/dissertation. However, the right to publish research will be maintained by the School of Computing. Copyright ownership of any research publications will be determined by University policy and by the policies of organizations responsible for publishing or distributing copyrighted materials.

At the direction of the Major Advisor, graduate students may be asked to keep a formal notebook for recording research procedures and results. Students are urged to study the recommendations for maintaining proper research records that are listed at the University's Patent Policy page (www.clemson.edu/research/technology/intellectual/basics.html).

All data, research notebooks, and related materials (slides, pictures, graphs, publication reprints, etc.) generated by any graduate student within the School of computing are the property of the school and will remain in the school after your graduation/departure. You must collect these materials and submit them to your Major Advisor before you graduate/depart. The Major Advisor will have final authority on the disposition of any or all of these materials.

Residence for Doctoral Degree

Residence is a necessary concept in graduate education, particularly in the preparation of the dissertation. The purpose of residence is to require you to spend a specified minimum amount of time in direct personal association with members of the faculty of the University and under direct advisement of your Major Advisor and Advisory Committee, and to participate in other normal activities pertinent to graduate education such as seminars and close association with other student researchers.

To receive the Doctor of Philosophy degree, you must complete at least fifteen (15) hours of graduate credit including research credit hours (991) on the Clemson University campus in a continuous one year (12-month) period.

For students employed substantially more than ½-time, a statement specifying the manner in which the residence requirement is to be satisfied shall be formulated by your Advisory Committee and included in your curriculum. Also, upon completion of the final examination, your Advisory Committee will forward to the Graduate School a statement approved by the School Director and college dean certifying that residence requirements have been met.

Exceptions to the residence requirement may be granted by the Dean of the Graduate School. Major Advisors seeking an exemption to this policy must submit an academic plan for the student that is signed by the Major Advisor and the School Director.

Final Examinations

Master's Final Examination for thesis option

Candidates for the thesis-option master's degree must pass a final examination at least three (3) weeks prior to the date of the convocation at which the degree is to be conferred. The final date for this examination is established each semester by the Graduate School. The examination is conducted by your Advisory Committee, but all faculty members are invited to participate.

You are required to submit your abstract title and abstract via e-mail to the SSGPC two (2) weeks prior to your defense date. The completed colloquium scheduling form is required to be handed in to the SSGPC immediately after your abstract title and abstract have been submitted. Both are required two (2) weeks before the scheduled date of the colloquium. The SSGPC will notify the Graduate School, school faculty, and other students in the school of the time and place of the examination at least ten days prior to the scheduled time.

Ph.D. Dissertation Defense

An oral examination given at least three (3) weeks before graduation will serve to examine your dissertation research. (See deadlines set by the Graduate School for the specific date for each term at

www.grad.clemson.edu/deadlines.html.) You are required to provide a broad and penetrating interpretation of your research project and conclusions. Your Advisory Committee members should receive a final draft copy of the dissertation at least two (2) weeks before the examination. This examination will be conducted under the authority of your Advisory Committee. The SSGPC will extend an invitation to all School of Computing faculty members, students and staff, along with the Graduate School Dean and Associate Deans, to participate in the examination and to provide comments to your Advisory Committee.

Successful completion of this examination and your dissertation will result in a recommendation (GS7 Form) by your Advisory Committee, through the SSGPC, to Enrolled Services that the Ph.D. degree be awarded.

Unsatisfactory performance on the final examination will result in a requirement for complete re-examination (with or without recommendations for additional work) or dismissal.

Expectations

The defense will be in front of a panel consisting of your Advisory Committee. The exam is graded on a Pass/Fail basis. A majority is needed to pass.

Only two attempts to pass the defense will be granted.

The defense is based on:

1. An oral defense of your research;
2. General questions in computer science as related to your research. You must also be prepared to answer basic questions about computer science beyond your area of specialization.

You will be expected to have an in-depth knowledge in your selected research area. In addition, you are also expected to be ready to answer all pertinent questions in the area based on the courses taken at the time of the examination that the panel deems relevant to the area of the proposed area of research.

Timing

You must complete your final examination at least three (3) weeks prior to graduation. We recommend that you set the schedule for the exam with your Advisory Committee as early in your final semester as possible, to ensure their availability and your completion of the requirement.

Application for Diploma

You must submit a formal application for a diploma to the Graduate School. You must complete this form online in the first four (4) weeks of the semester in which you intend to graduate. Early submission is not accepted (e.g., do not complete the form in January if you do not plan to graduate until August or December, only if you plan to graduate in May). If you miss the deadline, you must contact Enrolled Services to receive a hard-copy version of the application; late fees will accrue at \$25 the first day after the deadline and an additional \$5 each business day thereafter to a maximum of \$125. If you submit the form and, for some reason, do not graduate in that semester, you must re-submit in each term in which you hope to graduate thereafter.

If your name in the student database is not as you want it to appear on your diploma (due to marriage, etc.), you must contact Enrolled Services prior to submitting the Diploma Application form online. Any degree/major changes via form GS2 must also be processed before you submit the Diploma Application.

There is no fee to receive a diploma if you attend the graduation ceremony or agree to pick up your diploma in the Enrolled Services office in Sikes Hall. There is a \$10 fee assessed if you request that your diploma be mailed to you.

For more information, contact Enrolled Services at (864) 656-5339, if your last name begins with A-L, or (864) 656-5341 if your last name begins with M-Z.

If you choose to participate in graduation ceremonies, you should make arrangements for cap and gown purchase (or rental, if preferred, for Ph.D. gowns) at this same time. See the Clemson University Bookstore's website at www.clemson.edu/campus-life/campus-services/book-store/graduationitems.html for deadlines and more information.

Final Check-Out

When you leave the University due to graduation or any other reason, you must do the following pertaining to the department:

- Turn in all keys to the Administrative Assistant.
- Be sure that any portion of the office that you occupied is clean and ready for another occupant. Please leave your office in the condition you would have liked to have found it originally.
- Return all borrowed materials (books, journals, etc.) to their appropriate location.
- Any outstanding indebtedness (parking fines, overpayments, etc.) must be taken care of prior to your departure.

APPENDIX A

Course Descriptions (with updated prerequisites from Spring 2012)

CP SC 6040: Computer Graphics Images 3(3,0) Theory and practice behind the generation, and manipulation of two-dimensional digital images within a computer graphics context. Image representation and storage, sampling and reconstruction, color systems, affine and general warps, enhancement and morphology, compositing, morphing, non-photorealistic transformations. *Preq:* CPSC 212 and MTHSC 311, or DPA 401, or consent of instructor.

CP SC 6050: Computer Graphics 3(3,0) Computational, mathematical, physical, and perceptual principles underlying the production of effective three-dimensional computer graphics imagery. *Preq:* CPSC 212 and MTHSC 311, or DPA 401, or consent of instructor.

CP SC 6060: General Purpose Computation on Graphical Processing Units 3(3,0) Instruction in the design and implementation of highly parallel, GPU-based solutions to computationally intensive problems from a variety of disciplines. The OpenCL language with interoperable OpenGL components is used. Applications to models of physical systems are discussed in detail. *Preq:* CP SC 212 and MTHSC 206, or consent of instructor.

CP SC 6110: Virtual Reality 3(3,0) Design and implementation of software systems necessary to create virtual environments. Techniques for achieving real-time, dynamic display of photorealistic, synthetic images are discussed. Includes hands-on experience with electromagnetically tracked, head-mounted displays and requires, as a final project, the design and construction of a virtual environment. *Preq:* CP SC 212 and 215 with a C or better, or consent of instructor.

CP SC 6120: Eye Tracking Methodology and Applications 3(3,0) Introduction to the human visual system; visual perception; eye movements; eye tracking systems and applications in psychology, industrial engineering, marketing, and computer science; hands-on experience with real-time, corneal-reflection eye trackers, experimental issues. Final project requires execution and analysis of an eye tracking experiment. *Preq:* CP SC 212 or PSYCH 310 or MKT 431, or consent of instructor.

CP SC 6140: Human and Computer Interaction 3(3,0) Survey of human and computer interaction, its literature, history and techniques. Covers cognitive and social models and limitations, hardware and software interface components, design methods, support for design, and evaluation methods. *Preq:* CP SC 212 and 215 with a C or better, or consent of instructor.

CP SC 6160: 2D Game Engine Design 3(3,0) Introduction to the tools and techniques necessary to build 2-D games. Techniques draw from subject areas such as software engineering, algorithms and artificial intelligence. Students employ techniques such as sprite animation, parallax scrolling, sound, AI incorporated into game sprites and the construction of a game shell. *Preq:* CP SC 212 and 215 with a C or better, or consent of instructor.

CPSC 6190 [NOTE: to be renumbered as 8170]: Physically Based Animation 3(3,0) Physically-based modeling and dynamic simulation techniques as used for the automatic description of motion and geometry for animation and computer graphics. A variety of approaches are explored, with a special emphasis on the use of particle-systems to represent complex phenomena. *Preq:* CPSC 405 or consent of the instructor

CP SC 6200: Computer Security principles 3(3,0) Covers principles of information systems security, including security policies, cryptography, authentication, access control mechanisms, system evaluation models, auditing, and intrusion detection. Computer security system case studies are analyzed. *Preq:* CP SC 322 and 360 with a C or better, or consent of instructor.

CP SC 6240: System Administration and Security 3(3,0) Topics related to the administration and security of computer systems are covered. Primary emphasis is placed on the administration and security of contemporary operating systems. *Preq:* CP SC 360 and 322 with a C or better, or consent of instructor.

CP SC 6280: Design and Implementation of Programming Languages 3(3,0) Overview of programming language structures and features and their implementation. Control and data structures found in various languages are studied. Runtime organization and environment and implementation models are also included. *Preq:* CP SC 231 and 350 with a C or better, or consent of instructor.

CP SC 6550: Computational Science 3(3,0) Introduction to the methods and problems of computational science. Course uses problems from engineering and science to develop mathematical and computational solutions. Case studies use techniques from Grand Challenge problems. Emphasizes the use of networking, group development, and modern programming environments. *Preq:* MTHSC 108, 311 and previous programming experience in a higher level language, or consent of instructor.

CP SC 6620: Database Management Systems 3(3,0) Introduction to database/data communications concepts as related to the design of on-line information systems. Problems and solutions involving structuring, creating, maintaining, and accessing multiple-user databases are presented and solutions developed. Comparison of several commercially available teleprocessing monitor and database management systems is made. *Preq:* CP SC 212 and 215 with a C or better, or consent of instructor.

CP SC 6630: Online Systems 3(3,0) In-depth study of the design and implementation of transaction processing systems and an introduction to basic communications concepts. A survey of commercially available software and a project using one of the systems is included. *Preq:* CP SC 462, or consent of instructor.

CP SC 6720: Software Development Methodology 3(3,0) Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walk-through are discussed and used in a major project. Emphasis is on the application of these techniques to large-scale software implementation projects. Additional topics such as mathematical foundations of structured programming and verification techniques are also included. *Preq:* CP SC 372 with a C or better, or consent of instructor.

CP SC 6810: Selected Topics 1-3(1-3,0) Areas of computer science in which nonstandard problems arise. Innovative approaches to problem solutions which draw from a variety of support courses are developed and implemented. Emphasis is on independent study and projects. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

CP SC 7400: Computer Science for High School Teachers I 3(2,2) Modern problem-solving and programming methods for high school teachers; algorithm development, software life cycle concepts, system hardware and software components, and an introduction to programming in PASCAL. Restricted to graduate students and in-service teachers in secondary education. *Preq:* Introductory computer programming.

CP SC 8040: Data Visualization 3(3,0) This course introduces material on the theory and practice of designing effective visualizations of data from numerous sources. A broad overview to the field is presented, covering principles, methods, and techniques that are foundational to both information and scientific visualization.

CPSC 8050:: Advanced Computer Graphics 3(3,0) Advanced techniques used in the artificial rendering of natural scenes; current practice in computer graphics; full software implementation of each technique; extensive coding. *Preq:* CP SC 405 or consent of instructor.

CP SC 8070: 3D Modeling and Animation 3(3,0) Foundation principles and practice of modeling, animating and rendering of 3D computer graphics scenes. Students complete a series of projects using industry-standard software. Topics include modeling techniques, technical animation, rigging, materials, animation, lighting, scripting and post production. *Preq:* Digital Production Arts major or consent of instructor.

CP SC 8080: Advanced Animation 3(3,0) Foundation principles of the production of computer animation, from original concept development and character design, through rigging of articulated figures, character animation methods, and digital cinematography. *Preq:* CP SC 807 or consent of instructor.

CP SC 8090: Rendering and Shading 3(3,0) The art and science of lighting and shading for effective computer graphic imagery, including the mathematical, physical, and perceptual elements contributing to the simulation of a desired visual look. Shading languages, advanced rendering tools, global illumination effects, production of photoreal and non photoreal imagery. *Preq:* CP SC 807 or consent of instructor

CP SC 8100: Introduction to Artificial Intelligence 3(3,0) Problem solving and game playing; knowledge representation; expert systems; natural language processing; perception and learning. *Preq:* Consent of instructor.

CP SC 8110: Character Animation 3(3,0) This course introduces state of the art character animation algorithms and techniques and motion perception insights. Starting with fundamental methods in computer animation including transformations, kinematics, motion capture, and motion graphs to an overview of current research in topics such as animation controllers, emotions, gestures, and facial animation.

CP SC 8150: Special Effects Compositing 3(3,0) Video special effects, compositing problems, effects animation, matchmoving and 3-D geometry, color and texture reconstruction from 2-D images; extensive use of scripting languages and high-end software platforms. *Preq:* CP SC 605 or 807 or consent of instructor.

CP SC 8190: Physically Based Special Effects 3(3,0) The use of physically-based dynamic simulation techniques in the production of digital special effects. Course emphasizes tools, techniques and pipeline. Laboratory assignments are done using both commercial software and student's custom code. *Preq:* CP SC 619 or consent of instructor.

CP SC 8200: Parallel Architecture 3(3,0) Parallel processing issues; vector and pipeline processors; arrays of processing elements; associative processors; data flow computers; networks of processors; survey of parallel programming languages; design and implementation of parallel algorithms; future trends. Offered spring semester only. *Preq:* CP SC 330 or consent of instructor.

CP SC 8220: Case Study in Operating Systems 3(2,2) Case study of the design of an operating system. Class periods are devoted to reviewing source code and deducing the structure of the system. Lab exercises require students to make major changes to the system to enhance its performance on particular workloads. *Preq:* CP SC 322 or consent of instructor.

CP SC 8240: Advanced Operating Systems 3(3,0) Recent trends in system design and implementation; operating system structures to support reliable secure systems; verification techniques; fault tolerant systems; operating system considerations for closely coupled multiprocessor systems; network operating systems. Offered spring semester only. *Preq:* CP SC 322 or consent of instructor.

CP SC 8270: Translation of Programming Languages 3(3,0) Theoretical foundations and algorithms for compiling and interpreting programming languages. Topics include lexical analysis, syntactic analysis, semantics analysis, optimization, and code generation. Implementation of a compiler or a major component of a compiler is normally a term project. *Preq:* CP SC 350 and 352, or consent of instructor.

CP SC 8280: Theory of Programming Languages 3(3,0) Syntax and semantics of programming languages; finite state and pushdown processors; context-free models of syntax; parsing algorithms and semantic models. *Preq:* CP SC 350 and 352, or consent of instructor.

CP SC 8290: Advanced Compiler Topics 3(3,0) Code generation, register allocation, program optimization, data flow, inter-procedural operations, parallel compilation and distributed compilation. *Preq:* CP SC 827 or consent of instructor.

CP SC 8300: Systems Modeling 3(3,0) Fundamental concepts and techniques used in the stochastic modeling of computer and computer-based communication systems. Applications include hardware configuration design, software performance evaluation, and reliability estimation of fault-tolerant systems. Offered spring semester only. *Preq:* MTHSC 400 or 800, or consent of instructor.

CP SC 8380: Advanced Data Structures 3(3,0) Search trees; data structures for sets; index structures for data bases; data abstraction and automated implementation; implicit data structures; storage compaction of lists; data structures for decision trees; data structures in areas such as computer graphics, artificial intelligence, picture processing, and simulation. *Preq:* Consent of instructor.

CP SC 8390: Foundations of Theoretical Computer Science 3(3,0) Preparation for the study of advanced issues in computational complexity, algorithm correctness, and inherent limits to computing; set theory and proof techniques; classes of the Chomsky hierarchy. *Preq:* CP SC 350 or consent of instructor.

CP SC 8400: Design and Analysis of Algorithms 3(3,0) Basic techniques for design and analysis of algorithms; models and techniques for obtaining upper and lower time and space bounds; time/space trade-offs; inherently difficult problems. Offered spring semester only. *Preq:* CP SC 207 or consent of instructor.

CP SC 8450: Bioinformatics Algorithms 3(3,0) Covers algorithms such as dynamic programming for biological problems, including sequence alignment and phylogeny tree constructions; statistical and mathematical modeling of high throughput data, such as differentially expressed genes from microarray data and HMM for gene prediction; graph and network theory for biological networks.

CP SC 8480: Network Science 3(3,0) Network science is a common area in such disciplines as physical complex systems, communications, electrical circuits, social science, and bioinformatics with a common

formal basis when the studied system contains a set of objects connected together. In this course we will cover basic topics related to this common basis.

CP SC 8510: Software Systems for Data Communications 3(3,0) Structure of software systems supporting communications among computing devices having diverse processing and communication capabilities; characterization of data communications software in terms of unified network architectures consisting of several functional layers; evaluation of several network architectures. Offered fall semester only. *Preq:* Consent of instructor.

CP SC 8520: Internetworking 3(3,0) Network architecture and communication protocols underlying the global interoperability of the Internet. Topics include addressing and routing, interconnection of autonomous networks, naming and name resolution, connection management, flow and congestion control, and network management. *Preq:* CP SC 851, E C E 638, or consent of instructor.

CP SC 8530: Implementation of TCP/IP Protocols 3(3,0) Case study of the architectures of a widely used implementation of the TCP/IP protocol stack. Source code reviews illustrate layered design and use of core kernel services. Student projects include implementation of a complete transport protocol. *Preq:* CP SC 822 and 852, or consent of instructor.

CP SC 8540: Performance Analysis of Internet Protocols 3(3,0) Analyzes network performance, focusing on experimental methods and current Internet protocols. Covers random processes, time series analysis, and simulation concepts. Incorporates experimental-based research in computer networking. *Preq:* CP SC 852 or consent of instructor.

CP SC 8550: Embedded Network Systems 3(3,0) Discusses hardware fundamentals, technology applications, operating systems, programming platforms, software design and implementation, energy conservation techniques, self-stabilization paradigm, routing algorithms, clustering algorithms, time synchronization algorithms, and sensor actuator integration. *Preq:* Consent of instructor.

CP SC 8620: Database Management System Design 3(3,0) Concepts and structures for design and implementation of a DBMS; theoretical foundations for query systems; data modeling and information representation; user interface and internal system design considerations; system performance modeling and measurement; topics from the literature. *Preq:* CP SC 462 or consent of instructor.

CP SC 8630: Multimedia Systems and Applications 3(3,0) Principles of multimedia systems and applications; techniques in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image, and video; operating system and network issues in supporting multimedia; advanced topics in current multimedia research. Term project requires implementing some selected components of a multimedia system. *Preq:* Consent of instructor.

CP SC 8650: Data Mining 3(3,0) Study of principles of data mining: concepts and techniques of data analysis including regression, clustering, classification, association, prediction, etc.; efficient data mining algorithms; data mining applications in various areas including market analysis and management, WWW mining, bioinformatics, etc. Course projects for designing and using data mining algorithms in the applications are required. *Preq:* Knowledge of statistics and database systems or consent of instructor.

CP SC 8700: Software Design 3(3,0) Fundamental concepts of object modeling using object-oriented analysis and design; realistic application of software engineering principles within a variety of problem domains; mainstream language with facilities for object-training programming. *Preq:* Proficiency in programming in a procedural language.

CP SC 8710: Foundations of Software Engineering 3(3,0) Techniques and issues in software design and development; tools, methodologies, and environments for effective design, development, and testing of software; organizing and managing the development of software projects. *Preq:* Graduate standing in Computer Science or consent of instructor.

CP SC 8720: Software Specification and Design Techniques 3(3,0) Techniques, tools, environments, and formal methods for software specification and design; verification of design correctness. Offered fall semester only. *Preq:* CP SC 672 or consent of instructor.

CP SC 8730: Software Verification, Validation, and Measurement 3(3,0) Proofs of correctness; test planning; static and dynamic testing; symbolic execution; automated testing; verification and validation over the software life cycle; software metrics; software maintenance. Offered spring semester only. *Preq:* CP SC 672 or consent of instructor.

CP SC 8750: Software Architecture 3(3,0) Creation, analysis, and maintenance of architectures for software systems. Basic principles, patterns, and techniques. Quality attributes of the architecture are used to make a quantitative analysis. Students create and analyze two architectures from different domains.

CP SC 8770: Fundamentals of Biometric Systems 3(3,0) Methods and principles for automatic identification/authentication of individuals. Technologies include fingerprint, face, iris, and hand geometry. Additional topics covered include biometric system design, performance evaluation, multi-model biometrics, and ethics/privacy issues.

CP SC 8810: Selected Topics 1-3(1-3,0) Advanced topics from current problems of interest in computer science. Topics vary from semester to semester. May be repeated for credit, but only if different topics are covered. *Preq:* Consent of instructor.

CP SC 8880: Directed Projects in Computer Science 1-6 Directed individual project supervised by department faculty. To be taken Pass/Fail only.

CP SC 8910: Master's Thesis Research 1-12

CP SC 9400: Topics in Advanced Algorithms 3(3,0) Study of selected topics in advanced algorithms drawn from graph algorithms (network flows, matchings, cuts, planarity testing), approximation algorithms (traveling salesman, linear relaxation techniques), distributed algorithms (mutual exclusion, synchronization, self stabilization), parallel algorithms (parallel prefix, models, sorting), or randomized algorithms (sampling, probabilistic methods, random walks). May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* CPSC 840 or consent of instructor.

CP SC 9500: Selected Topics in Computer Science 1-3(1-3,0) Study of advanced topics from current problems of interest in computer science. May be repeated for a maximum of 12 credits, but only if different topics are covered. To be taken Pass/Fail only.

CP SC 9510: Seminar in Algorithms 1-3(1-3,0) Advanced topics from current problems of interest in algorithms. May be repeated for credit.

CP SC 9550: Seminar in Programming Languages 1-3(1-3,0) Advanced topics from current problems of interest in programming languages. May be repeated for credit.

CP SC 9570: Seminar in Software Engineering 1-3(1-3,0) Advanced topics from current problems of interest in software engineering. May be repeated for credit.

CP SC 9810: Seminar in Computer Science 1-3(1-3,0) Topics of current research interest. May be repeated for credit.

CP SC 9910: Doctoral Dissertation Research 1-12

H C C 8310: Fundamentals of Human-Centered Computing 3(3,0) Fundamental concepts in human-centered computing, including human subjects, interface design, usability evaluation methods, software programming, information technology tools, ethics, policy, and current problems of interest to human-centered computing.

H C C 8320: Statistical Methods for Human-Centered Computing 3(3,0) This is an applied course in data analysis with special emphasis on applications to Human-Centered Computing experimental data and systems evaluation. Students will learn both appropriate analysis methods for research in HCC and develop skills at using available statistical packages such as JMP and R.

H C C 8330: Research Methods for Human-Centered Computing 3(3,0) Research methods supporting scholarly research and publication in human-centered computing. Topics include scientific method, identification and creation of research problems, archive searches, design of experimental and nonexperimental research, interdisciplinary approaches, technical writing and ethics.

H C C 8350: Spoken Language Systems 3(3,0) This course is a special topics course on natural language processing and spoken language systems. The course covers design, implementation, testing, and evaluation of these systems.

APPENDIX B

Faculty Listing

- **Amy Apon** (*aapon@clemson.edu*)
Professor and Chair, Computer Science Division; Ph.D., Vanderbilt.
High performance computing.
- **Sabarish Babu** (*sbabu@clemson.edu*)
Assistant Professor; Ph.D., UNC Charlotte.
Virtual environments, 3D human-computer interaction, virtual humans.
- **Kelly Cain** (*caine@clemson.edu*)
Assistant Professor; Ph.D., Georgia Tech.
- **James Clements** (*president@clemson.edu*)
Professor; Ph.D., UMBC.
- **Shaundra Daily** (*sdaily@clemson.edu*)
Assistant Professor; Ph.D., MIT.
Human-centered computing.
- **Tim Davis** (*tadavis@cs.clemson.edu*)
Associate Professor; Ph.D., North Carolina State.
Computer graphics, distributed computing.
- **Brian C. Dean** (*bcdean@clemson.edu*)
Associate Professor; Ph.D., M.I.T.
Algorithms, combinatorial optimization.
- **Andrew T. Duchowski** (*duchowski@clemson.edu*)
Associate Professor; Ph.D., Texas A&M.
Human visual perception and human-computer interaction,
graphics, vision.
- **Robert M. Geist III** (*geist@cs.clemson.edu*)
Professor; Ph.D., Notre Dame.
Systems modeling, performance evaluation, reliability
modeling, graphics.
- **Jill Gemmill** (*gemmill@clemson.edu*)
Research Assistant Professor; Ph.D., UAB.
Cyberinfrastructure.
- **Wayne Goddard** (*goddard@clemson.edu*)
Associate Professor; Ph.D., M.I.T.
Graph theory, algorithms, game-playing.

- **Harold C. Grossman** (*grossman@clemson.edu*)
Professor Emeritus; Ph.D., Michigan State.
Programming language theory, design, and implementation;
software development methodology.
- **Jason Hallstrom** (*jasonoh@clemson.edu*)
Associate Professor; Ph.D., Ohio State.
Software engineering, wireless sensor networks,
design patterns, programming languages
- **Sandra M. Hedetniemi** (*shedet@clemson.edu*)
Professor; Ph.D., Virginia.
Data structures, analysis of algorithms.
- **Catherine Hochriner** (*cashiel@cs.clemson.edu*)
Lecturer; M.S., Clemson.
- **Larry F. Hodges** (*lfh@clemson.edu*)
Professor and C. Tycho Howle Director, School of Computing; Ph.D., N.C. State.
3D users interfaces, virtual environments, visualization.
- **Donald H. House** (*dhouse@clemson.edu*)
Professor and Chair, Visual Computing Division; Ph.D., Massachusetts.
Computer graphics, visual perception, visualization.
- **Hongxin Hu** (*hongxih@clemson.edu*)
Assistant Professor; Ph.D., Arizona State.
- **David P. Jacobs** (*dpj@cs.clemson.edu*)
Professor Emeritus; Ph.D., Missouri.
Algorithms, algebraic computation. **James H. Jones** (*jimjones@clemson.edu*)
Visiting Lecturer; B.S. EE, Clemson.
- **Sophie Joerg**
Assistant Professor; Ph.D., Trinity College, Dublin.
Animation and perception in computer graphics.
- **Renee S. Lambert** (*rlmbert@clemson.edu*)
Lecturer; B.S., Communications, Eastern Michigan.
- **Josh Levine**
Assistant Professor; Ph.D., Ohio State.
Geometric modeling, scientific visualization.
- **Rose M. Lowe** (*lowerm@clemson.edu*)
Senior Lecturer; Ph.D., Clemson.
Neural networks, genetic algorithms.

- **Feng Luo** (*luofeng@clemson.edu*)
Assistant Professor; Ph.D., Texas at Dallas.
Bioinformatics, biological data mining, biological Database.
- **A. Wayne Madison** (*wayne@clemson.edu*)
Associate Professor; Ph.D., Virginia.
Operating systems, performance measurement and evaluation.
- **Brian Malloy** (*malloy@cs.clemson.edu*)
Associate Professor; Ph.D., Pittsburgh.
Languages, compilers, parallel processing, software maintenance and testing, simulation modeling.
- **Jim Martin** (*jmarty@clemson.edu*)
Associate Professor; Ph.D., N.C. State.
Computer networking, Internet protocols and issues, network security.
- **John McGregor** (*johnmc@clemson.edu*)
Associate Professor; Ph.D., Vanderbilt.
Software engineering, graphical systems, object-oriented development.
- **Diedra Morrison** (*diedram@clemson.edu*)
Research Assistant Professor
- **Roy P. Pargas** (*pargas@cs.clemson.edu*)
Associate Professor; Ph.D., North Carolina.
Parallel computation, genetic algorithms.
- **Sekou Remy** (*sremy@clemson.edu*)
Assistant Professor; Ph.D., Georgia Tech.
- **Ilya Safro**
Assistant Professor; Ph.D., Weizmann Institute of Science.
Large-scale data analysis and optimization, multiscale and multilevel methods, network analysis and methods for HPC.
- **Murali Sitaraman** (*murali@cs.clemson.edu*)
Professor; Ph.D., Ohio State.
Software engineering, reusable software.
- **Mark Smotherman** (*mark@clemson.edu*)
Associate Professor; Ph.D., North Carolina.
Computer architecture, performance, and reliability.
- **Jacob Sorber**
Assistant Professor; Ph.D., University of Massachusetts, Amherst.
Security, performance, and usability of mobile systems and sensor networks.

- **Pradip Srimani** (*srimani@clemsom.edu*)
Professor; Ph.D., University of Calcutta.
Parallel and distributed computing, interconnection networks,
graph theory applications, mobile computing.
- **Pat Sterling** (*psterli@clemsom.edu*)
Lecturer; M.S., Clemson.
- **D.E. "Steve" Stevenson** (*steve@clemsom.edu*)
Professor Emeritus; Ph.D., Clemson.
Numerical analysis, computational science, computation theory.
- **Joachim Taiber**
Research Professor; Ph.D., ETHZ.
- **Jerry Tessendorf** (*jtessen@clemsom.edu*)
Professor and Director, MFA Program in Digital Production Arts; Ph.D., Brown.
Animation, physically-based special effects.
- **James Wang** (*jzwang@clemsom.edu*)
Associate Professor; Ph.D., Central Florida.
Multimedia, database systems, operating systems, distributed
network computing and storage management.
- **Ken Weaver** (*weaver3@clemsom.edu*)
Lecturer and Undergraduate Student Services Coordinator; Ph.D., Clemson.
Student performance and pedagogies, student services technologies.
- **Damon L. Woodard** (*woodard@clemsom.edu*)
Associate Professor; Ph.D., Notre Dame.
Computer Vision, pattern recognition, video image analysis and biometrics.
- **Catherine Zambaka**
Adjunct Assistant Professor; Ph.D., UNC Charlotte.