

HANDBOOK

Ph.D. with a major in Building Construction

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Preface

Purpose of this Handbook

General Georgia Tech policies and procedures for graduate education are established by the Georgia Tech Faculty Senate. These policies can be found at:

<http://gradadmiss.gatech.edu/>

This Handbook presents the requirements and policies of the Doctor of Philosophy with a Major in Building Construction degree program within the School of Building Construction.

PH.D. PROGRAM HANDBOOK

SCHOOL OF BUILDING CONSTRUCTION GEORGIA INSTITUTE OF TECHNOLOGY

INTRODUCTION

The Doctor of Philosophy degree program in the School of Building Construction (BC) was approved by the Board of Regents in October 2011; the degree awarded is the Doctor of Philosophy with a major in Building Construction. Previously, the College of Design administered the Doctor of Philosophy degree program, which served as an umbrella program for Ph.D. studies in the areas of Architecture, Building Construction, City and Regional Planning, and Music Technology.

The Ph.D. program in the College of Design was initiated in 1982 and offered fields of study for majors throughout the entire college, including Building Construction. The College was reorganized in 2009, thus creating five schools; as part of these administrative changes, there was a proposed expansion of the existing doctoral program, which was previously administered at the College-level, into the schools. A Ph.D. program for the School of Building Construction (BC) was discussed as part of the College's strategic planning associated with the administrative reorganization. The College's umbrella Ph.D. program was thus disbanded in 2009; as of fall 2011, the Schools of Building Construction, Architecture, City and Regional Planning, and Music each administer their own distinct doctorate degree program.

Students *previously admitted* to the College of Design's Doctor of Philosophy with a major in Architecture with a field specialization in Building Construction can continue with their current program and will *adhere to the previous College policies*, including those regarding admission requirements, course requirements, qualifying exams, and the dissertation. *New students* admitted to the Doctor of Philosophy with a major in Building Construction degree program will adhere to the guidelines and policies outlined in this manual. Students admitted to the previous College-based program have the *option to switch* to the Doctor of Philosophy with a major in Building Construction degree program and may be required to revise their course of study and degree requirements accordingly; decisions will be made by the School of Building Construction Chair and BC Faculty on a case-by-case basis.

The Doctor of Philosophy with a major in Building Construction degree program aims to train the next generation of individuals who will make substantial contributions to the field in both research and in practice. In emphasizing original interdisciplinary scholarship in key and emerging areas, such as sustainability, technology, and energy, graduates of the program will be at the forefront of knowledge application and production in these critically important areas; they will engage in key problem-solving roles which have the potential to positively impact not just the industry, but all of society through renewable energy, enhanced efficiency, improved quality of life for building occupants, reduced costs, and safer workplaces. This doctorate degree prepares research scholars, new faculty and professionals for positions in the military, universities, private laboratories, industry, and government agencies, as well as facilitate a higher level of investigation and knowledge creation through the professor and doctoral student dynamic.

Requirements for the Ph.D. are established by the Georgia Institute of Technology and the School of Building Construction. Completion of a field of study frequently requires additional work beyond the basic requirements presented here.

ADMISSION

Prerequisites

Students must have a master's degree from an accredited university to be considered for admission to the Ph.D. program; graduate-level training should be in architecture (i.e., MS, M. Arch), building construction (i.e., MSBC), civil engineering (i.e., MSCE), or a related field (i.e., facility management, project management) which demonstrates they have knowledge in fundamentals of building construction/science, design/planning, operations/management and/or engineering principles. By being admitted to the program, students will be committed solely to pursue the Ph.D. Degree with a Major in Building Construction. No other degrees can be sought in parallel, unless expressly approved by the BC Graduate Faculty at the time of admission or transfer. Students with graduate-level training in another discipline may be admitted to the program if they demonstrate substantial professional experience (5+ years) in the Architecture/Engineering/Construction and Facility Management industry. Admissions decisions are made by BC Graduate Faculty.

Admission to the Ph.D. program is competitive and requires submission of a graduate application, including official transcripts from all attended institutions, official GRE scores (with TOEFLs for international students), letters of recommendation, and a personal statement.

Application Checklist

The following documents must be submitted before an application will be considered:

- **Online application through Graduate Admissions:**
<http://www.gradadmiss.gatech.edu/apply-now>
- **Application Fee**
- **Three Letters of Recommendation**
- **Examples of previous research and written works**
- **Official transcripts from all previously attended institutions of higher learning**
- **Statement of Personal and Professional Goals**
- **Personal Biography Form**
- ***Test of English as a Foreign Language (TOEFL) for non-U.S. residents/citizens whose native tongue is other than English***
- **Graduate Record Examination (GRE) score**
- **Financial Statement (for non-U.S. residents/citizens)**

Evidence of academic competence is required, with expected minimums being as follows: 3.0 GPA, 1200 combined score on GRE quantitative and verbal sections (for exams taken prior to August 2011); 310 combined score on GRE quantitative and verbal sections (for exams taken in August 2011 or later); 4.0 GRE analytical writing score; 100/120 TOEFL score (on the Internet-based test); high level of professional competence demonstrated by work history and letters of recommendation.

Applications for admission are due by **January 15**. All accepted students enter the program in the fall semester.

DESCRIPTION OF THE PROGRAM

This section presents an overview of the Ph.D. degree program; more detailed information is presented in separate sections.

Program Requirements

The program of study requires a minimum of one year of full-time residency (not fewer than two semesters, excluding summer) devoted to coursework and other preparation for completion of the comprehensive exam on the second year. A total of 60 credit hours will be required for this Ph.D. degree beyond the master's degree. Programs of study must include a program core of 13 credit hours, a minimum of 12 credit hours of concentration electives, and a minimum of 9 hours in a minor field; a minimum of 26 dissertation credit hours is also required. The major and minor requirements are minimums; the particular field of study may require additional work.

The required minimum core courses for all students in this program will be:

- BC 7100 Quantitative Methods in Construction Research (3 credit hours)
- BC 7200 Advanced Readings in Building Construction (6 credit hours)
- BC 8000 PhD Seminar (1 credit hour)
- BC 8100 Research Methodology (3 credit hours)

A minimum of 12 credit hours of concentration electives, chosen from a list of approved electives (revised every semester by the faculty in the School of Building Construction, included in Appendix A), will be required. This list is composed of graduate courses offered by other units at Georgia Tech. A minimum of 9 credit hours of coursework will be required for the minor. A minimum of 26 credit hours of thesis, including a minimum of 12 credit hours of BC 8999 Doctoral Dissertation Preparation and a minimum of 14 credit hours of BC 9000 Doctoral Thesis, will be required. Additional requirements will be established by the Ph.D. Advisor, in consultation with the BC Graduate Faculty on a case-by-case basis, in order to ensure that each student is taking courses which can directly assist them toward gaining advanced proficiency in their chosen area of research.

A program of study must be approved by the student's Ph.D. Advisor before the end of the first year. Each student will have a plan of study to ensure that the student's educational goals may be achieved while meeting the academic policies of the Institute and the Ph.D. program. The Building Construction Ph.D. program will enable students of exceptional ability and with a strong interest in research to undertake advanced study in the field of building construction and facility management; it will also build on existing collaborations between the School and other academic units in the Institute to encourage interdisciplinary scholarship.

A student must choose a minor field of study that is most relevant to her or his research, with the major field being in Building Construction. The minor field must be outside of the School of Building Construction, must include at least 9 hours of coursework taken on a letter grade basis of "B" or better, and must be approved by the Ph.D. Advisor, working in consultation with Graduate Faculty in the School of Building Construction, and by the Office of Graduate Studies. Although the student's plan of study will be approved, the student must additionally submit a letter and receive approval for the completion of the coursework on the chosen minor.

An overview of program requirements includes:

- A program of study must be approved by the student's Ph.D. Advisor. Additional requirements may be set by the Graduate Faculty in the School of Building Construction.
- The student must have a minor field of study; the minor field must be outside of the School of Building Construction and must include at least 9 hours of coursework. The minor must be approved by the Ph.D. Advisor, working in consultation with BC Graduate Faculty, and the Office of Graduate Studies.
- Complete a Qualifying Paper, if applicable.
- Pass a Ph.D. comprehensive (qualifying) examination consisting of written and oral portions.
- Complete a Ph.D. proposal and orally defend the proposal. The student is considered a Ph.D. candidate following the approval of the proposal by the Dissertation Committee.
- Complete a Ph.D. dissertation and orally defend the dissertation.

To remain in good standing in the program, a student must be enrolled in a minimum of 6 credit hours of coursework (not including independent study) per semester during completion of the required four semesters in residence. Exceptions to this requirement will be allowed upon approval of the BC Graduate Faculty.

Graduate Research and Teaching Assistants (GTAs and GRAs) must be registered for at least 12 credit hours. If their intended coursework is insufficient to fulfill this requirement, GRAs and GTAs may register for Research Assistantship hours (BC 8998) or Teaching Assistantship hours (BC 8897) for up to 3 credit hours per semester. These hours are not accepted for fulfillment of Ph.D. course requirements.

After or while taking the required 6 credit hours of Advanced Readings in Building Construction (BC 7200) that will prepare the student for the Comprehensive Examinations, the student must register for a minimum of 12 hours of Doctoral Dissertation Preparation (BC 8999); generally, these hours are taken in the third year of study in preparation for the Dissertation Proposal. Typically, an additional year or more is required to complete the dissertation. During semesters in which the student is working on the dissertation, he/she must register for a minimum of 3 credit hours of Doctoral Dissertation (BC 9000). In total, a minimum of 14 credit hours of BC 9000 are required for graduation, and a minimum of 26 credit hours of dissertation hours are required. Satisfaction of the requirements for the Ph.D. degree includes successful public defense of the dissertation.

Advising

Each student works under the direction of a Ph.D. Advisor throughout the duration of their studies; during the first term of residence, the student should select an advisor. Ph.D. Advisors are members of the School of Building Construction academic faculty; the Advisor will serve as Chair of the Ph.D. Examining Committee and the Ph.D. Dissertation Committee. Although this Advisor has primary responsibility and authority for the student's program, most major steps and proposals are also reviewed by the BC Graduate Faculty during regular meetings, who may make recommendations to the Advisor. These meetings will occur once or twice a year,

depending on the student's progress, and will be arranged through the School's Academic Advisor. The doctoral students will also work in consultation with the School's Academic Advisor who can assist with registration, permits and Institute requirements.

Selection of Ph.D. Advisor

During the first term of residence, the student should select an Advisor. The Advisor will consult regularly with the BC Graduate Faculty to evaluate student progress.

Faculty who serve as Ph.D. Advisors are active in scholarship in their field and hold a Ph.D. degree. In exceptional cases, a member of faculty who does not hold a doctorate, but demonstrates an active program of scholarship and has had experience as a member of a dissertation committee, may be appointed as an Advisor, subject to the approval of the School of Building Construction Chair.

The Ph.D. Advisor is the student's partner and mentor, assisting development of the student's field of study, and tracking progress toward completing the program. Students are encouraged to meet with other faculty in addition to the Major Advisor to explore questions associated with their field of study or related issues. The student's Ph.D. Advisor, along with the BC Graduate Faculty, will serve to not only ensure that the student's plan of study and research is in line with the aims of the program, but they will serve in an advisory role to ensure the student is acclimated to the community of science; in this role, the Ph.D. Advisor and BC Graduate Faculty will assist the student in finding appropriate academic venues with which to present and/or publish their research, as well as advise them in any appropriate scholarship or fellowship opportunities.

The Ph.D. Advisor will:

- Meet with the student as soon as it is practical to develop a program of study. The program of study will be sent to the Chair for final approval.
- Meet regularly with the student to ensure they are taking courses relevant to their research area and are progressing favorably within the program.
- Meet regularly with the BC Graduate Faculty to ensure students are progressing successfully in the program. These meetings will occur once or twice a year, depending on the student's progress, and will be arranged through the School's Academic Advisor.
- Assist the student in issues related to professional socialization, such as providing guidance on professional memberships, conference attendance, and presentation.
- Approve or otherwise act on changes to the student's program of study.

Selection of Minor Advisor

In addition, each student must designate a Minor Advisor, who is responsible for the student's course of study in their minor area. The Minor Advisor also participates in the student's Comprehensive Examination.

The Major and Minor Advisors may change over the course of a student's program, subject to the approval of the School of Building Construction Chair. If a student wishes to change the Advisor, he or she must petition the School of Building Construction Chair for approval of such a change.

Selection of Ph.D. Examining Committee

The Ph.D. Advisor, in consultation with the student, will establish a *Ph.D. Examination Committee* consisting of: The Ph.D. Advisor; a BC faculty member; and the Minor Advisor. This committee is

expected to remain with the student for the duration of their course of study and will form the foundation of the Ph.D. Dissertation Committee.

Selection of Ph.D. Dissertation Committee

The requirements for the make-up of the Ph.D. committee reflect the following: 3 members must be from the School of Building Construction (one of those may be from the College of Design, but the primary Advisor will be a BC faculty member); one member must be from outside the College of Design (i.e., College of Engineering, College of Business); and one committee member must be from outside the Institute (can be from another academic institution or from industry – private or public sector). This committee make-up ensures that our students are exposed to interdisciplinary perspectives and have the potential opportunity to incorporate industry perspectives into their research.

Curriculum

The required minimum core courses for all students in this program will be: a) BC 7100 Quantitative Methods in Construction Research (3 credit hours); b) BC 7200 Advanced Readings in Building Construction (6 credit hours); c) BC 8000 PhD Seminar (1 credit hour); and d) BC 8100 Research Methodology (3 credit hours). A minimum of 12 credit hours of concentration electives, chosen from a list of approved electives (revised every semester by the faculty in the School of Building Construction), will be required. A minimum of 9 credit hours of course work will be required for the minor. A minimum of 26 credit hours of thesis, including a minimum of 12 credit hours of BC 8999 Doctoral Dissertation Preparation and a minimum of 14 credit hours of BC 9000 Doctoral Thesis, will be required. Additional requirements will be established by the Ph.D. Advisor, in consultation with the BC Graduate Faculty on a case-by-case basis, in order to ensure each student is taking courses which can directly assist them toward gaining advanced proficiency in their chosen area of research.

Curriculum Overview:

Program Core 13 credit hours

Four program core courses:

BC 7100 Quantitative Methods in Construction Research	(3 credit hours)
BC 7200 Advanced Readings in Building Construction	(6 credit hours)
BC 8000 PhD Seminar	(1 credit hour)
BC 8100 Research Methodology	(3 credit hours)

Concentration Electives 12 credit hours (minimum)

To include the study of: history and precedent in the field; theory and concepts and their evolution; current debate; and methods of analysis and inquiry.

Minor Field of Study 9 credit hours (minimum)

To include the study of: relevant history and precedent in the field; relevant theory; current debate; and methods of analysis and inquiry.

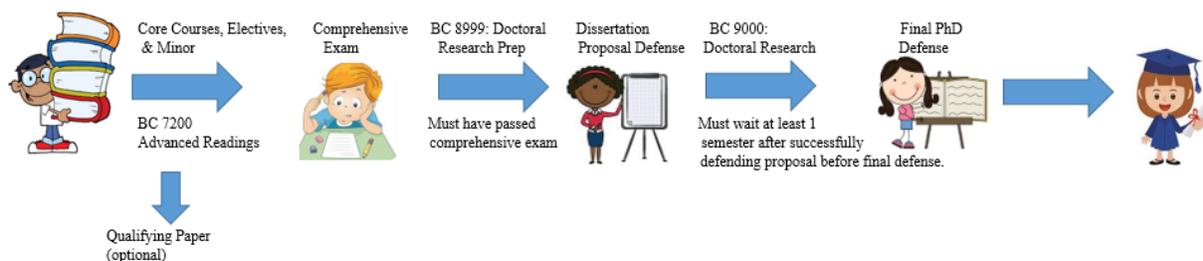
Dissertation Preparation 26 credit hours (minimum)

BC 8999 Doctoral Dissertation Preparation	(12 credit hours minimum)
BC 9000 Doctoral Thesis	(14 credit hours minimum)

Total Course Requirements: 60 credit hours (minimum)

A **sample** timeline is presented below:

Milestone	Timeframe
Develop Program of Study	Before start of 1 st semester
Core Coursework	Year 1
Minor and Electives	Year 1, 2
Qualifying Paper ¹	End of Year 1
Comprehensive Exam	End of Year 2
Doctoral Research Prep- BC 8999 (must have passed comprehensive exam before taking BC 8999)	Year 3
Defend Ph.D. Proposal & Ascend to Ph.D. Candidacy	Year 3
Doctoral Research- BC 9000 (must have successfully defended Ph.D. Proposal before taking BC 9000)	Year 4-6
Complete and Defend Ph.D. Proposal (must wait at least 1 semester after successfully defending Ph.D. proposal)	Year 4-6



The four core courses that are required for all students in this program will be taught on a regular basis each year. Additional requirements imposed by the Ph.D. Advisor and BC Graduate Faculty will be evaluated on a case-by-case basis. The Ph.D. degree program will not have any other core requirements; instead, the students will take courses directly in support of their research, including elective courses available in the School, the College and the Institute. Specific courses ensure that research methods, teaching techniques, and scholarly work worthy of critical peer review are developed. Additionally, the courses require students to be directly engaged in current intellectual debates and provide them with the methods of analysis, inquiry, and scholarship to generate meaningful and original contributions to the major and emerging issues in the discipline. The Minor Area encourages students to individualize their course of study by focusing on an area of complementary study outside of the College of Design. These courses,

¹ Some students may be required to complete a qualifying paper to demonstrate their writing and analytical skills; students who need to complete this requirement will do so at the end of their first year of study. Students who do not adequately demonstrate writing skills prior to admission will be notified of the potential requirement; the decision on which students will be required to complete this paper will be made by the faculty advisor in conjunction with the graduate faculty, during the admission process.

along with the make-up of the Ph.D. Dissertation Committee which includes members from outside the College of Design and outside Georgia Tech, will also promote collaboration and interdisciplinary research.

Typical Course of Study

The following is an example of a planned program of study. To be considered in good standing in the Ph.D. program, full-time students are expected to accomplish these target completion dates for coursework and other program requirements, unless there are valid reasons to extend the period of study. Expectations for programs of study for students enrolled less than full-time, in consultation with the Academic Advisor and the BC Graduate Faculty, will be defined on an individual basis.

First Year

- Coursework
- Appointment of Advisor
- Submission of Program of Study
- Development of approved Qualifying Paper proposal
- Year-end progress report submitted by student and Advisor

Second Year

- Completion of coursework
- Appointment of Examining Committee
- Completion of Comprehensive Examinations
- Year-end progress report submitted by student and Advisor

Third and Fourth Year

- Appointment of Dissertation Committee
- Submission of Dissertation Proposal
- Approval of Dissertation Proposal
- Dissertation research
- Year-end progress report submitted by student and Advisor
- Committee review of Dissertation
- Defense of Dissertation
- Awarding of Ph.D. degree

Program Core

Each student is required to enroll in thirteen (13) credit hours of Program Core, consisting of three core courses and one seminar course. The core required courses are: BC 7100 Quantitative Methods in Construction Research (3 credit hours); BC 7200 Advanced Readings in Building Construction (6 credit hours); BC 8000 PhD Seminar (1 credit hour); and BC 8100 Research Methodology (3 credit hours).

Major and Minor Fields of Study

The major field of study is Building Construction; beyond the program core, students are required to take a minimum of 12 credit hours of Concentration Electives in support of their major area of research. By aligning the BC doctorate degree with the engineering model, students will be encouraged to focus on scholarship and creating original research; the program likewise coincides with the Institute's enduring values of innovation, impact and excellence by nurturing and fostering a culture of ingenuity, creative problem-solving, intellectual curiosity, and global citizenship.

The student's Ph.D. Advisor has discretion to require other courses within the College, Institute, or other units within the University System of Georgia, consistent with the student's expressed interest in their selected field of concentration. Courses in the student's concentration area should prepare the student to make significant research or scholarly contributions to their chosen field. They are expected to cover a range of topics including: history and precedent in the field, theory and its evolution, current debate, methods of analysis and inquiry.

A student must also choose a minor field of study that is most relevant to her or his research, with the major field being in Building Construction. The purpose of the minor is for the student to gain and demonstrate competence in theoretical foundations and method(s) of inquiry in an area or to acquire the concepts of another area relevant to the student's major area of student. Students are expected to determine their minor field of study by the end of their first year in residency. The minor field must be outside of the School of Building Construction. Although the student's plan of study will be submitted for approval, the student must additionally submit a letter and receive approval for the completion of the coursework on the chosen minor. A Doctoral Minor form is to be completed and submitted along with the completed Admission to Candidacy documents (also referenced on p. 34) to the Academic Advisor.

Requirements for the minor are met by satisfactory performance (defined as a B or better grade) in courses composing not fewer than nine (9) credit hours (these courses must be taken for letter grade). Three of the 9 required hours may consist of independent study credit.

Some examples of Minors outside the School of Building Construction:

- Management
- Manufacturing
- Computer Graphics
- Databases
- Economics
- Education
- Environmental Studies
- Geography
- Finance
- Thermodynamics
- Philosophy
- Psychology
- Public Policy/
Political Science
- Real Estate
- Sociology
- Statistics
- Transportation
- Technology and
Science Policy

The minor must be chosen by the student in consultation with the student's Ph.D. Advisor, and approved by the Institute's Office of Graduate Studies. Coursework for the major and minor should be at the 6000 level or above; 4000 level courses may be allowed with permission of the student's Advisor. No more than one (3 credit hour) Special Problems course will be allowed for the minor.

The student is encouraged to identify a Minor Advisor in the course of fulfilling the Minor requirements. The Minor Advisor can advise on the courses in which the student should enroll to gain desired competency in the area. Later, the Minor Advisor will participate in preparing and evaluating the Comprehensive Examination and serve on the Ph.D. Examining Committee.

Program of Study

Each student entering the Ph.D. Program will select a Ph.D. Advisor who serves on the Building Construction academic faculty. Working with the Advisor, and no later than the end of the first year, the student should submit a plan of study to the Chair of the School of Building Construction. The plan of study should propose:

- a) major and minor areas of study including a list of courses taken or to be taken;
- b) plan for fulfillment of core requirements.

This proposed plan of study must accompany the year-end report submitted to the School at the completion of the first academic year.

Additional requirements imposed by the Ph.D. Advisor and BC Graduate Faculty will be evaluated on a case-by-case basis; Graduate Faculty in the School of Building Construction will meet regularly to evaluate student progress.

Typical Example of Program of Study for Full-Time Student
(Minor in Environmental Remediation)

First Semester	Credit hours
BC 6300 Safety and Environmental Issues	3
BC 7100 Quantitative Methods of Construction Research	3
BC 8100 Research Methodology	3
ISYE 6414 Regression Analysis	3
Second Semester	Credit hours
BC 7200 Advanced Readings in BC	6
BC 8000 Doctoral Seminar	1
ISYE 6416 Computational Statistics	3
CEE 6342 Solid Waste Technology	3
Third Semester	Credit hours
BC 8999 Doctoral Dissertation Preparation (must have passed comprehensive exam)	6
ISYE 6650 Probabilistic Models	3
CEE 6120 Environmentally Conscious Design & Construction	3
Fourth Semester	Credit hours
BC 8999 Doctoral Dissertation Preparation (must have passed comprehensive exam)	9
CEE 6355 Industrial Ecology in Environmental Engineering	3
Fifth Semester	Credit hours
BC 9000 Doctoral Dissertation (must have successfully defended the proposal)	12
Sixth Semester	Credit hours
BC 9000 Doctoral Dissertation (must have successfully defended the proposal)	12
Seventh Semester	Credit hours
BC 9000 Doctoral Dissertation (must have successfully defended the proposal)	12
Eighth Semester	Credit hours
BC 9000 Doctoral Dissertation (must have successfully defended the proposal)	12

Required credit hours: 60

Total credit hours for minor field of study: 9

Total credit hours for concentration electives: 12

Total credit hours for program core: 13

Total credit hours thesis: 63

Total credit hours: 97

Year-End Reports

Students are required to submit year-end reports to the School that update their progress relative to the program of study. These reports should be submitted in hard copy and in electronic form (e.g., email, flash drive), and include:

- a) Name of Ph.D. Advisor;
- b) Major and minor courses taken or to be taken (including course titles, professors with whom the courses were taken, and grades received; if directed/independent study courses are used, a copy of the course syllabus/outline, reading list, and the final product produced for the course.)
- c) Other coursework taken or to be taken;
- d) Major milestones completed and date of completion;
- e) GPA; and
- f) Other accomplishments, including conference presentations, publications, and so forth.

At the completion of the first year in the program, all students admitted to the Ph.D. program are subjected to a careful review; and students are advised whether they will be permitted to continue in the program. Students will also be notified as to whether they are required to complete a Qualifying Paper. This review takes into account the information provided in their end of year report, his or her participation in the scholarly and research activities in the College, and the BC Graduate Faculty's opinion of the student's likelihood of successfully completing the Ph.D. degree.

Elective Option: Qualifying Paper

On the advisement of the Graduate Faculty in the School of Building Construction during the admission process, some students may be required to complete a qualifying research paper before proceeding to the Comprehensive Exam. The qualifying paper may be recommended for some students that need additional testing to demonstrate advanced knowledge in their research area and/or practice improving their research writing and analytical skills, as deemed appropriate by the Graduate Faculty. Students who do not adequately demonstrate writing skills prior to admission will be notified of this potential requirement; the decision as to which students will be required to complete this paper will be made by the faculty Advisor in conjunction with the BC Graduate Faculty.

The qualifying paper is designed to demonstrate the student's capacity to effectively conduct, analyze, and communicate research and to encourage the student toward continued scholarship and publication of research. The paper must be reviewed and approved by the Ph.D. Advisor and BC Graduate Faculty. The School's Academic Advisor will file a qualifying paper approval document. The paper is a chapter-length presentation of research undertaken by the student under direction of the student's Major Advisor. The length of the paper is normally expected to be in the 6,000 – 10,000-word range. The research may be quantitative or qualitative, historical or empirical. It may be an original idea of the student, original analysis of an existing data source, or a portion of a larger research project. The paper must make an original contribution to knowledge in some clearly specified way, and shall be of a standard suitable for publication in a refereed journal or equally rigorous scholarly publication. A research proposal submitted and reviewed by a panel could also be considered acceptable as a qualifying paper.

Comprehensive Examinations

The exam will test the student's mastery of both theory and methods of analysis and inquiry in both his/her major and minor fields. It will be administered toward the end of the student's program of course work and is intended to assess the student's competence in the fields of knowledge covered by his/her program of studies. The Comprehensive Examination is composed of a set of examinations representing the major field and the minor field. The scope of each field should include its development, theory, and methods of analysis and inquiry.

The *Ph.D. Examining Committee*, which includes the Advisor, who will function as Chair, at least one more examiner in the major field (who can be academic faculty in the College of Design), and at least one examiner in the minor field, will inform the student as to the scope of the examination. The Examining Committee will administer both parts of the examination and a majority vote (one dissenting vote allowed) is required in principle for the student to receive a passing decision on the examination. If the Committee Chair's vote is negative, the student must take a second examination to address the concern in the major field. The faculty members on the Examining Committee will also serve on the Ph.D. Dissertation Committee. The Advisor will inform the student and the Chair of the School of Building Construction of the results of the examination. If the student fails the examination or needs to address a concern from the Committee Chair, a second examination must be retaken no sooner than six months and no later than twelve (12) months after the date of decision of the first examination. If the student does not take the second examination, or if the student does not pass the second examination, the student will be dismissed from the Ph.D. program.

At least one month before the scheduled date of the examination, the student's Ph.D. Advisor will submit a brief proposal to the Chair of the School of Building Construction. The proposal should include: 1) the membership of the Ph.D. Examining Committee, and a 2) bibliography in the major and minor fields that includes a domain for the examination agreed upon by the student and the Ph.D. Examining Committee. If it is proposed that examiners from outside of Georgia Tech be members of this examination committee, their qualifications (name, address, and 2-page bio) must be included in this proposal.

The examination will be administered and evaluated by the student's Ph.D. Examining Committee. The typical examination would be in the form of a set of rigorous take-home questions or written assignments whose answers demonstrate the ability to integrate and extend state-of-the-art knowledge. The number of assignments per exam shall be at least two but shall not exceed four. At each examination, the student should pick up the assignments at a prescribed time and place and return the completed examination within the allotted time. The student will be allowed no more than three days per question to prepare his/her responses in the form of scholarly, yet succinct essays. In the event of examinations being divided into parts or separated, no more than two weeks should elapse between any two parts or examinations.

The Ph.D. Examining Committee should meet within two weeks of the delivery of the last of the responses. The examiner(s), in consultation with the Committee Chair, may conduct an oral review with the student for the purpose of clarifying the content of all or part of the responses, exploring ideas presented in those responses, or expanding on ideas or themes suggested by those responses. Requisition of an oral defense is at the discretion of the Examination Committee.

The examiners responsible for the comprehensive examination will meet to determine one of the following outcomes for the examination as a whole.

- *Pass* indicates exemplary or adequate response to a given examination. This result indicates that the student has demonstrated not only mastery of materials, but the capacity to synthesize that material into a compelling argument or thorough discussion.
- *No pass with remediation* indicates that while the student's responses demonstrate an adequate foundation in an area, the responses show important weaknesses in the way the student interpreted the question(s), interpreted or applied the literature or methods of inquiry applicable to the question(s), or otherwise did not offer a compelling argument or thorough discussion. The examiners, in consultation with the School of Building Construction Chair, would determine the appropriate remedial actions short of having the student retake the entire examination. Successful completion of the requirements of the remedial action shall *Pass* the student, while failure to meet the requirements shall constitute a failure of the examination.
- *Fail* means that the student has not demonstrated sufficient mastery of material and/or ability to offer a compelling argument or thorough discussion. The student must not only work out a plan for remedial studies with the examiners, in consultation with the School Chair, but retake the examination when such studies are satisfactorily completed. If a student fails a second Comprehensive Examination, the student is automatically dismissed from the Ph.D. Program and cannot be readmitted.

The student's Ph.D. Advisor and the Examining Committee make their recommendation to the School Chair. The student's Ph.D. Advisor will also transmit to the Chair the results of any remediation or reattempt of assignments.

Dissertation

The student will propose, conduct, and defend a work of original scholarship. The dissertation topic must give promise of being either a genuine addition to the fundamental knowledge of the field or a new and better interpretation of facts already known. The student should decide on a dissertation topic as early as possible.

Upon satisfactory completion of the Qualifying Paper (if applicable) and the Comprehensive Examination, a Dissertation Committee shall be formed and the student shall work with this committee throughout the dissertation process. The dissertation process requires production and formal presentation of a dissertation proposal; whose satisfactory completion leads to Ph.D. Candidacy. Following the written completion of the dissertation, it is defended orally.

Dissertation Committee

The composition of the Dissertation Committee includes five individuals, three of whom served on the Ph.D. Examination Committee. The Dissertation Committee includes: the Advisor (who is a member of the School of Building Construction academic faculty) as Chair; two other BC faculty members (one of whom can be from the College of Design); one non-College of Design Georgia Tech faculty member (Minor Advisor); and one external committee member from academia or industry. The majority of the committee shall be members of the Georgia Tech academic faculty.

The Dissertation Committee is charged with:

- working with the Ph.D. student in identifying a dissertation topic and developing a dissertation proposal;
- convening the dissertation colloquium and rendering a decision on advancement to candidacy;
- managing the dissertation process;
- convening the dissertation defense and rendering a decision on awarding the Ph.D. degree;
- sending a letter to the School of Building Construction Chair and BC Academic Advisor certifying that the dissertation has been satisfactorily completed.

Occasionally, the Ph.D. student may need or wish to replace a member of the Dissertation Committee. The process for replacement is as follows:

- The Ph.D. student presents the reasons for the replacement and nominates a replacement for consideration by the Committee Chair, or, if the Chair is to be replaced, by the School Chair.
- The Committee Chair shall review the circumstances and the request and shall make a decision that may accept, deny, or modify the Ph.D. student's request. This recommendation will be rendered within two weeks of receipt of the request. However, the request must come during an academic semester (excluding summer) and not less than two weeks prior to the last class of any given semester.
- The Ph.D. student is entitled to only one replacement. The exception would be if the student wishes to pursue an entirely different program of study, or if the referee determines there is cause for such a replacement not related to academic or scholarly differences. No changes will be allowed to the composition of the Committee once the final draft of the dissertation has been distributed for review.

During preparation of the dissertation proposal, the student may enroll in BC 8999 with hours to be agreed upon with the Advisor.

Dissertation Proposal and Advancement to Ph.D. Candidacy

In consultation with his/her Dissertation Committee, the student will identify a dissertation topic and develop a formal dissertation proposal. The topic is not required to be contained within one field of study, rather it may be interdisciplinary in nature. The dissertation proposal contents, defense, and decision on advancement to candidacy are outlined below.

Contents of Dissertation Proposal. Typically, the dissertation proposal contains the following elements:

- General statement of the scope of the dissertation;
- Significance of the dissertation to a recognized body of knowledge;
- Survey of existing research and literature with critical comments and an assessment of the extent to which this material will be utilized;
- Overall research design and method of inquiry and/or analysis;
- Outline of the anticipated dissertation contents;
- Working or preliminary bibliography; and
- Identification of resources such as databases or information repositories on which the dissertation will be based.

The Dissertation Committee shall reserve the right to further specify the nature of the proposal.

Proposal Presentation. Upon submittal of the dissertation proposal to the Dissertation Committee with at least two weeks' advance notice, a presentation will be arranged at which the proposal will be formally presented to interested faculty, students, and guests. The presentation is intended to notify scholars of the work to be undertaken, the manner of the research, and its significance. It also gives scholars the opportunity to suggest refinements in the manner of inquiry, or ask additional questions that may substantially advance the meaningfulness of the work.

The announcement of the Dissertation Proposal Presentation must be made at least two weeks prior to the presentation date. It must include the proposal title, abstract, and the Dissertation Committee membership. The announcement is to be made to the BC Graduate Faculty and students, and other potentially interested faculty on the Georgia Tech campus. The format of this session is a short presentation of the dissertation proposal by the student, followed by questions and discussion by the Dissertation Committee and other interested participants.

Candidate Status. Upon completion of the proposal presentation, the Dissertation Committee will meet to decide on the candidacy status of the Ph.D. student. There are four possible decisions that the committee may render:

- *Approval* means that the proposal needs very minor or no further refinements, the student has been advanced to candidacy, and the dissertation work may commence. If there are refinements necessary, the candidate can be trusted to incorporate those refinements into the dissertation work without further review by the Dissertation Committee.
- *Approval with minor modifications* means that the proposal needs minor refinements to address concerns raised during the colloquium that will be required of the dissertation, but the student is nonetheless advanced to candidacy and the dissertation work may commence. Such refinements will be reviewed by the Dissertation Committee Chair, who may accept or reject the refinements, or require further modifications.
- *Approval with further review* means that the proposal is in such need of modifications that the Dissertation Committee needs to condition approval on its further review of the proposal. Only when the Dissertation Committee deems the modifications adequate will the student be advanced to candidacy and the dissertation work may commence.
- *Non-approval* means that the proposal is not suitable for further consideration and either must be reworked and presented again, or a different topic must be developed.

Under no circumstances may a student receive two non-approvals; if two non-approval decisions are rendered by the Dissertation Committee, the student is automatically dismissed from the Ph.D. program and cannot be readmitted.

For recognition of the status of **Ph.D. candidacy**, the student must complete a form (Admission to Ph.D. Candidacy form, accessible from the School Academic Advisor) for approval by the School of Building Construction and the Office of Graduate Studies naming the Advisory Committee and delineating the dissertation topic, as well as attach a copy of the approved dissertation proposal. At the same time the student must list the courses taken for both the major and minor areas, and the grades received in those courses. The student is to prepare the Admission to Ph.D. candidacy form in advance and bring it to the proposal presentation in order to obtain the signatures of the Advisory Committee members.

The Dissertation Document

The Ph.D. dissertation is a written piece of original scholarship that represents a significant new perspective or contribution in the chosen field of study. The candidate must complete a searching and authoritative investigation in the chosen field, culminating in a written dissertation covering that investigation. The dissertation must be either an addition to the fundamental knowledge of the field or a new and substantially better interpretation of facts already known. The dissertation is required to demonstrate that the candidate possesses powers of original thought, is able to structure and carry out an original research undertaking, and is able to organize and present the logic of the research enterprise and its results. The dissertation must be presented in the format appropriate to the candidate's field. It will meet the criteria published in [Manual for Graduate Theses](#), which is available in the Institute's Office of Graduate Studies.

Dissertation Hours. After advancement to candidacy, students must complete at least twenty-six (26) credit hours of dissertation hours (BC 8999 Doctoral Dissertation Preparation and BC 9000) in not more than twelve (12) credit hours per semester. Thereafter, students must register for a minimum of three (3) credit hours of BC 9000 per semester (excluding summer) until graduation. The credit hours may be reduced to one credit hour during the last term of the Ph.D. program, during which the dissertation is completed. This reduction may be used only once.

Review by Dissertation Committee. The Dissertation Committee will evaluate the draft(s) of the dissertation when ready, ascertain whether it has met the objectives stated in the proposal, and determine whether it meets minimal standards for dissertations. Candidates must take care that the draft(s) presented for review are complete and correct. Any committee member may return a draft unread where that member deems the draft of inappropriate quality, content, organization, style, or presentation. Members of the Dissertation Committee must be afforded not less than two weeks during an academic semester (excluding summer) between the first and last days of class in which to review material.

Dissertation Defense (Final Ph.D. Examination). When the Dissertation Committee agrees that the dissertation is satisfactory for defense, the Chair will notify the School Chair that the final examination can be scheduled. The letter of notification must state that the dissertation is in final form and that all members of the Dissertation Committee have read this final form, and agree that it is satisfactory for defense. In addition to this notification, the Chair provides recommended nominations for at least one (see below) external examiner(s) (including name, address, and 2-page bio of any non-Georgia Tech faculty). The student must provide the BC Office with complete copies of the final dissertation draft for distribution to the external examiner(s).

The Chair of the Dissertation Committee will coordinate the defense with the School of Building Construction Chair. The date for the defense must allow adequate time for the evaluations of the external examiners. The School requires a *minimum* of 14 days to schedule a defense (by Institute regulation). The defense must be scheduled during an academic semester (excluding summer) between the first and last days of class. At least two members of the Dissertation Committee and a majority of the members of the Examining Committee must be present at the Examination; teleconference or similar communication means can be used to allow members become present at the defense. At least two weeks prior to the defense, the time and place of the

defense shall be announced to the faculty of the School of Building Construction and College of Design, and copies of the dissertation will be made available for general faculty review. The student is to prepare a doctoral Certificate of Dissertation Approval form in advance and bring it to the dissertation defense in order to obtain the signatures of the Dissertation Committee members.

The format of the defense is a presentation of the dissertation by the student (approximately 30-60 minutes), followed by questions and discussion by the Dissertation Committee, and open questions/discussion from the audience. The final examination is to determine whether all the minimal standards for the dissertation have been met.

The student must register for the semester in which the final examination occurs and for the semester of graduation. A waiver of this requirement maybe obtained **only** if all requirements for graduation, including submission of the final approved dissertation, have been completed prior to the last day of registration, and the student was registered for the preceding semester. During the semester preceding the final semester of work, the candidate must submit an Online Application for Graduation (OAG).

Ph.D. Decision. Upon completion of the dissertation defense, the Examining Committee will meet to decide on the Ph. D. status of the candidate. There are four possible decisions the committee may render: approval, approval with minor modifications, conditional approval with further review by the Dissertation Committee, and non-approval. The decision of the Examination Committee must be by a majority of members with not more than one member dissenting on the decision.

- *Approval* means that the dissertation needs very minor or no further refinements. If minor refinements are necessary, the candidate will be trusted to incorporate those refinements into the dissertation without further review.
- *Approval with minor modifications* means that the dissertation needs minor refinements to address concerns raised during the dissertation defense that will be required of the dissertation. Such refinements will be reviewed by the Examination Committee Chair, who may accept or reject the refinements, or require further modifications.
- *Approval with further review* means that the dissertation is in such need of modifications that the Examination Committee needs to condition approval on further review of a new draft of the dissertation. The Examination Committee will determine if this review is to be conducted by the full Examination Committee or the Dissertation Committee. Only when such modifications are deemed adequate will the student be awarded the Ph.D. degree.
- *Non-approval* means that the dissertation is not suitable for further consideration and either must be reworked and presented again, or a different topic developed.

If both the dissertation and the examination are satisfactory and the candidate has completed all other requirements, the Office of Graduate Studies will certify the candidate as qualified to receive the degree of Doctor of Philosophy. The student is responsible for submission to the School of Building Construction office of the appropriate forms, signed by the Dissertation Committee, upon satisfactory completion of the dissertation and defense.

Under no circumstances may a student receive two non-approvals; if two non-approval decisions are rendered by the Examining Committee, the student is automatically dismissed from the Ph.D. Program and cannot be readmitted.

Residency Requirements

Students must be in residence at Georgia Tech for at least one year. After that time special arrangements must be made with the Ph.D. Advisor and the School Chair if substantial work will be performed elsewhere. Ordinarily, research for the dissertation must be completed while in residence. Students must complete the Qualifying Paper, comprehensive examinations, and dissertation proposal within five (5) years of the end of the first semester in which they enrolled as a Ph.D. student at Georgia Tech. Students must complete all degree requirements within five (5) years from the end of the semester in which they receive candidacy status.

If a student is not active (not enrolled in coursework) for two or more academic semesters, the student must apply for readmission to the program. The readmission decision will depend on the student's academic record and progress toward the degree.

Student Life and Professional Development

The School of Building Construction's goal is to provide students with an excellent education that is grounded in theory and research, as well as practical application. As such, we also recognize the need to professionalize our graduates into the culture of the workplace through experiences and opportunities that will help students begin to network locally, nationally, and, potentially, internationally; to communicate research findings to others in a variety of forums and venues; and to interact, work, and learn in an interdisciplinary environment, as well as make connections with members of industry.

The School offers a weekly meeting and seminar that brings the graduate students together to build a research culture and research community. Meeting topics vary and speakers are invited based on the chosen topic. These meetings also provide opportunities for graduate students to present a conference paper or dissertation chapter that is pre-circulated and commented upon by one of their peers. BC faculty may also present a paper on their research interests, in order to introduce students to their work as well as to contribute to the community's intellectual conversation. Several times a semester, speakers from inside and outside of Georgia Tech are invited to present new research of interest to the field. Attendance at these seminars is required for all full-time, funded students.

Writing, communicating, and presenting research are integral to successful scholarship. As such, the School strongly encourages its doctoral students to take courses through [Georgia Tech's Center for the Enhancement of Teaching and Learning](#). CETL offers professional development courses for graduate students on topics such as how to prepare presentations, teaching effectiveness, and improving writing skills. CETL also provides guidance for graduates seeking employment and offers courses on such topics as preparing a CV for maximum impact and where to search for jobs.

Every graduate student is also strongly advised to join one or more professional societies pertinent to their field of interest, and to attend annual conferences to present research, meet other graduate students with the same interests, and gain a rapid overview of many of the latest research published in the field, and network with the national and international research community. In addition, all graduate students are advised to join the Student Construction

Association (SCA), the student organization housed in the School of Building Construction. SCA holds monthly meetings and organizes social and community service activities as well as opportunities to compete in regional and national design-build championships. SCA is affiliated with several different national organizations, including the following: Associated General Contractors of America; Associated Builders and Contractors; Design Build Institute of America; and Mechanical Contractors Association of America. These affiliations provide students with the opportunity to network with professional organizations, participate in competitions, and seek internship and research opportunities.

FINANCIAL AID

The program offers a variety of financial aid opportunities to its students. Most types of financial assistance at the graduate level are merit-based rather than need-based. Because of the ongoing academic and research activities, research assistantships and scholarships are often available. Out-of-state tuition waivers (allowing non-Georgia residents to pay resident tuition fees) are awarded on a competitive basis to selected students in their second year of study. Minority students and women are eligible to participate in the Regents' Opportunity Scholarship Program. These are renewable awards for residents of Georgia for two semesters of study. Additional information on the Regents' Opportunity Scholarship may be obtained from the Institute's Graduate Studies and Research Office. Need-based aid is also available from the Institute's Financial Aid Office.

The following list provides examples of the range of funding sources available, and is not intended to be exhaustive.

Fellowships

- *President's Fellowships*

Each year, the Institute awards fellowships to applicants with outstanding academic records and high research potential. The award, which consists of a significant supplement to an existing assistantship or other fellowship, is for one calendar year and is renewable for three additional years upon recommendation of the student's major school.

- *President's Minority Fellowships*

This fellowship is awarded to minority applicants with outstanding academic records and high research potential. The award, which consists of a significant supplement to an existing assistantship or other fellowship, is for one calendar year and is renewable for three additional years upon recommendation of the student's major school.

Assistantships

- *Graduate Teaching Assistantships (GTAs)*

Teaching Assistantships are awarded to students capable of making significant contributions to the instructional programs within the School of Building Construction. These awards, which carry full tuition waivers, are normally offered to students on a one-third time basis.

- *Graduate Research Assistantships (GRAs)*

Research assistantships may result from the service needs of the College or from faculty sponsored research activities. These awards, which carry full tuition waivers, are ordinarily offered to students on a one-third time or half-time basis, depending on the source of funds.

Scholarships and Sponsored Scholarships

- *Regent's Opportunity Scholarships*

These scholarships are available to aid economically disadvantaged students who are minorities and residents of Georgia. These renewable awards are \$5,500 each for one academic year of study.

Outside Grants and Fellowships for Students

- Students are encouraged to apply for grants and fellowships from research centers and funding agencies, such as the National Science Foundation. Your Ph.D. Advisor and BC faculty can provide valuable advice about possible research funding.

Aid Programs

- Office of Financial Aid Programs (Institute, State, Federal, etc.)
- Independent (of Institute) Private and Government Foundations, Programs, etc.

GEORGIA TECH

The Institute

Founded in 1885, the Georgia School of Technology became the Georgia Institute of Technology in 1948. The first class, made up of mechanical engineers, was held on a campus of five acres. Today, Georgia Tech is an internationally renowned research university and a national and international leader in scientific and technological research and education with more than 900 full-time instructional faculty and more than 20,000 undergraduate and graduate students. The campus consists of more than 400 acres in the heart of Atlanta. Students enroll from every state in the union and eighty countries.

The College of Design

The College of Design, formerly College of Architecture until 2016, at Georgia Tech is one of the largest and oldest architectural schools in the country. Founded in 1908, Architecture was established as a separate college in 1975. Today, the College has almost 1200 students and more than 100 full- and part-time faculty. These figures include students enrolled in the School of Architecture, Building Construction, City and Regional Planning, Industrial Design, and Music. The College presently offers a number of master's degree and doctorate degrees.

The School of Building Construction

In 2009, following administrative restructuring at the College of Design, the Building Construction Program was renamed The School of Building Construction. The transition from the Building Construction Program to the School of Building Construction was an important step in recognizing the growing prominence of the program and the growing needs of the construction industry, as well as granting greater autonomy to the School.

The School of Building Constructions offers the following graduate degrees: The Master of Science (M.S.) degree in Building Construction and Facility Management, which has two concentrations: Building Construction and Facility Management. The former has two tracks: Construction Management (contractor's perspective) and Program Management (owner's perspective), the Professional Masters in Occupational Safety and Health, and the Doctor of Philosophy (Ph.D.) with a major in Building Construction.

The BC Graduate Faculty is comprised of individuals with extensive research backgrounds in the areas of: integration of technology and automation; feasibility of state-of-art emerging alternative energy sources for buildings; evaluation protocols for technology innovations in the built environment; sustainable facility management; healthcare facility management; strategic facility planning; economic decision analysis of energy efficient buildings; sustainable property investments; innovative project delivery systems real options approach for investment valuation of public-private partnerships (PPPs); financial evaluation of highway projects under traffic demand uncertainty; infrastructure asset management construction information technology; computer vision and pattern recognition applications; intelligent jobsite automations construction safety; HCI issues in mobile applications for AEC information access; Situation Awareness driven information system design; and role-based decision support systems. These

areas of research reflect the School's emphasis on conducting research of relevance to the construction industry; this also coincides with the focus on research at the College level. As evidenced, the School of Building Construction now houses three research laboratories dedicated to innovative technology and cutting edge research in the construction industry; these labs provided training and research opportunities for doctoral students, as well as assistantships.

In addition to the dramatic increase in sponsored research projects, from both private and public sponsors, BC faculty have garnered national and international recognition for their scholarly contributions to the field, publishing in top journals and presenting at the leading academic conferences. BC faculty also bring their own industry experience to the classroom and also serve in key leadership positions in professional associations, are involved in service and community outreach efforts in the greater Atlanta area, and are frequently asked to lecture and give keynote addresses in their respective areas of expertise.

Library Resources

The **Library and Information Center's** scientific, engineering, architectural, and management collection includes 3.9 million volumes and 2.7 million technical reports, as well as the largest collection of patents in the Southeast. The government documents collection contains over 1.3 million publications and more than 170,000 maps. The library currently receives approximately 12,000 serials, 75 percent of them in scientific and technical fields.

The catalog record of the Library is one of the databases available on the Georgia Tech Electronic Library (GTEL) website, and is used by faculty, staff, and students through the campus computer network. The Avery index to Architectural Periodicals can also be searched through GTEL. Catalogs from thirteen other libraries in the area may be accessed through GTEL. An electronic resource called GALILEO provides comprehensive access to a number of databases, including dissertation abstracts and the full text of approximately 2,800 academic journals. Library materials from all over the world are available through inter-library loan.

The **Architecture Library** functions as a department of the Main Library and houses the Library's collections of books on architecture and art, as well as a representation of materials in other fields such as art history and theory, urban and regional planning, industrial design, landscape, building construction, energy and historic preservation. The Architecture Library's holdings include approximately 29,000 books, periodicals, and serials, and close to 67,000 slides.

Institute Computer Facilities

Computer facilities are fundamental for most aspects of university education and research.

At the Institute level, the **Office of Information Technology** provides network and mainframe support for campus computing activities. It provides customer support, educational technologies, institute-level information services for registration, accounting, human resources, parking and a variety of expanding services. It also addresses information security for the campus, operations and engineering, and planning and resource management.

The Office of Information Technology has also made agreements with various software distributors in order to supply the campus with their software needs on their personal laptops. To use this website and install software, you must meet the following requirements:

- You must be a **current** Georgia Tech student, faculty member, or staff member.
(All software must be uninstalled when you leave.)
- You must have an active GT Account.

Other computing services provided by the Institute include:

LAWN (Local Area Wireless/Walkup Network)

[The Georgia Tech LAWN](#) is designed for students, faculty and staff who are mobile computer users. Mobile users may have wireless-enabled laptop computers, PDAs, or similar devices. The LAWN gives mobile users a way to connect to many of the same computing resources available to them from a campus office or student residence hall. The LAWN has wired walkup ports in the Library and College of Computing, and wireless “hot spots” in and around many campus buildings.

BuzzPort

[BuzzPort](#) is a campus portal with features designed to help students and faculty interact more effectively with campus services and colleagues. The portal integrates and organizes online communications and resources (calendars, groups, message boards, chats, administrative) that can be used in everyday tasks.

All campus computer labs may be accessed by Georgia Tech students upon presentation of a valid student ID. See <http://www.oit.gatech.edu/> for further details.

College of Design Computing Facilities

The College of Design (COD) has several computer labs which are accessible to all undergraduate and graduate students.

The Computer Teaching Lab (West Architecture Building Room 359) is the College's main computing teaching lab. It is equipped with 40 Intel-based PCs running XP Professional. This lab is open to student use when the labs are not being used for classes.

General Purpose Computer Lab (West Architecture Building Room 358) gives students access to the latest equipment and software to help them with their studies. Access is available twenty-four hours a day, seven days a week. The lab is closed over Institute holidays.

Studio Computing Some computer labs in the College are reserved for use by students enrolled in a particular academic program. We currently have studio labs for the following groups: School of Architecture graduate and dissertation students; School of Industrial Design students; School of Music students; School of City and Regional Planning students; and School of Building Construction students.

Tech Support Office (West Architecture Building Room 359a) is where students can get assistance with most problems concerning computer accounts, software, or computer problems. Other services provided in Room 359a include:

- Scanning oversize documents up to 40" wide in B/W or Color
- Purchasing supplies such as CD-Rs
- Paying for and picking up plots
- Receiving assistance with software, hardware, or networking problems

The College of Design IT Department has equipment available for checkout in the Technology Resource Center (West Architecture Building Room 359a), including digital cameras; a Mini-DV video camera; projectors; and A/V carts. In order to check out equipment, users must leave their BuzzCard.

College of Design students also have access to the following:

- **IMAGINE Facilities:** IMAGINE (Interactive Media Architecture Group in Education) is a group of researchers and students from the College of Design and other campus units dedicated to the development of new media technology and preparing students in its use. Services available are scanning, photo CD slide scanning, electronic-image-to-slide transfer, CD-ROM burning, and video editing. All PC workstations feature DVD-ROM playback, Iomega ZIP 250 drives, CD-ROM, CD-R, CD-RW, and Audio CD. Available software includes AutoCAD, Adobe Illustrator & Photoshop, LiveMotion, 3-D Modeling, and Director 8.5 Shockwave Studio.
- **Photography Lab:** This facility, a 1,300 square-foot, 15-station chemical darkroom laboratory (black and white), is housed on the first floor of the East Architecture building. Access to the photo lab is restricted to faculty, photography assistants and students who are enrolled in a college photography class at that time. Anyone else wishing to use the photo lab must obtain written permission from the photography instructor.

Off-Campus Access

Access network files from your PC with virtual private network (VPN)

Georgia Tech Office of Information Technology offers a VPN service for all faculty, staff, and students that can be used to access institute resources from off campus. When the VPN is running in connection with a broadband connection or wireless hotspot, the computer is connected directly to the Georgia Tech network. Current Georgia Tech students, faculty, or staff with an active GT account can download the software at no cost.

College of Design Virtual Lab

Access Computer Lab Software with Virtual Desktop Interface (VDI)

Virtual Desktop Interface (VDI) gives College of Design students access to all the software found on the College's lab computers from any computer with an internet connection and browser (note, you must have admin rights on the computer to access VDI). With VDI, students also have access to printing and file sharing resources.

Additional computing facilities are provided to the Georgia Tech campus by the Institute's Office of Information Technology (OIT). Information about these facilities can be found at <http://www.oit.gatech.edu/>.

CORRESPONDENCE AND INFORMATION

Please contact:

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CHECKLIST OF PH.D. ADVISOR RESPONSIBILITIES

The following check-list summarizes the actions taken by a Ph.D. student and his/her advisory committee during their progress through the program. Informal actions are described in regular text, and formal actions in italics:

- Annually: Year-End Report (see description on p. 13 of this handbook)*

Year One:

Advise student, develop course of study, identify minor area, plan financial support for full Ph.D. period (if possible)

Year Two:

Advise student, identify minor area advisor

Completion of Course Requirements:

- Upon completion of the course requirements, as set forth in this document, the student is to prepare the list of courses taken and the allocation of them to the different requirements. All independent study courses used to fulfill these requirements are to be further described with a short description of the work undertaken and the product that resulted from the work. This list is to be reviewed and signed by the student's Advisor and submitted to the School of Building Construction office.*

Qualifying Paper (Optional):

The Qualifying Paper, if required, is to be reviewed by the student's Advisor and the BC Graduate Faculty.

- For one semester, while preparing for the qualifying paper, students may optionally enroll for 3 credit hours for BC 7200 Advanced Readings in BC.*
- Upon approval, a letter or email is sent to BC School Chair with a copy of the Qualifying Paper, with a cover letter from the Advisor stating it has been accepted.*

Comprehensive Examination:

The Comprehensive Examination is reviewed by the student's primary advisor, a second Ph.D. faculty advisor (member of BC Graduate Faculty) and the student's minor area advisor.

- A Comprehensive Examination Proposal is to be submitted by the student's advisor to the School Chair giving: (1) member of the Comprehensive Examination Committee, (2) definition of the major and minor areas and bibliography in each area.*
- The Comprehensive Exam can have three outcomes: Pass, No Pass, Fail (see this document for interpretation).*
- Upon Approval or Rejection, the primary Advisor is to write to the School Chair regarding the resolution of this requirement.*

Dissertation Proposal

A student's Dissertation Committee consists of the primary Advisor and at least two additional members (see text for qualifications).

The Dissertation Proposal is a written document, reviewed until endorsed for presentation by the Dissertation Advisory Committee.

The Proposal is then presented in a public presentation to the GA Tech community. Two weeks advance notice to the GA Tech community is required.

Outcomes of the dissertation presentation can be: Approval, Approval with minor modifications, Approval with further review, Non-approval (see text for description of these outcomes).

- *Student submits Ph.D. Admission to Candidacy Form. It includes the names and signatures of Dissertation Advisory Committee, dissertation title and abstract, and is attached to a copy of the proposal.*
- *While preparing for dissertation proposal, student may optionally enroll in BC 8999. After dissertation approval, student must enroll in the BC 9000 course while working on dissertation.*

Dissertation Defense

A student's Dissertation Committee must consist of at least five members (qualified as defined on p. 17 of this document). Students must be enrolled during the semester when the dissertation is submitted.

- *During the semester preceding the final semester of dissertation work, the candidate must submit an Online Application for Graduation (OAG). The deadlines and instructions for the OAG are published on the Registrar's Office website, which houses the Institute calendar; all pertinent deadlines and instructions are also communicated by the BC Academic Advisor.*
- *Prior to the dissertation defense, the Examination Committee must approve the dissertation for presentation, submitting a letter of notification. This letter must also identify the additional Readers who will augment the original Dissertation Committee.*
- *The student must arrange with each external examiner the time period in which the document will be read and examiners must be given a minimum of 14 days to read the complete draft.*
- *A minimum of 14 days is required to schedule a defense (by Institute regulation). The defense must be scheduled during an academic semester (excluding summer) between the first and last days of class. At least two members of the Dissertation Committee, and a majority of the members of the Examination Committee must be present at the Examination.*
- *At least two weeks prior to the defense, the time and place of the defense shall be announced to the faculty of the College of Design, and copies of the dissertation will be made available for general faculty review.*
- *The student is to submit to the School of Building Construction office the appropriate forms, signed by the Dissertation Committee, upon satisfactory completion of the dissertation and defense.*

Appendix A. Concentration Electives

BC 6002 Issues in Sustainable Construction Technology Course designed to help students achieve a basic understanding of the materials used in the commercial segments in the construction industry and how these relate to sustainable construction. 3 credit hours
BC 6004 Sustainable Energy in AEC An introductory course on sustainable energy in architecture, engineering and construction. The goal of the course is to introduce students to fundamental concepts of sustainable sources of energy to power buildings and address the impact of these sources to applicable green building rating systems. 3 credit hours
BC 6025 Construction Management An accelerated paced course providing graduate students a basic understanding of fundamental topics including planning, budgeting, estimating, scheduling and project closeout. 3 credit hours
BC 6100 Professional Trends in Facility Management An introductory course covering the organizational, managerial, ethical, and legal principles for the delivery of facility management services. Includes contracts and risk management. 3 credit hours
BC 6125 Professional Internship A course in which students work for a professional architecture/engineering/construction company in which they learn, first-hand, about the construction industry. 3 credit hours
BC 6250 Value Management and Integrated Design Principles and methodology of value management analysis concepts and an examination of future values and worth criteria affecting building design, construction, furnishings, and operations performance. 3 credit hours
BC 6400 Facility Planning, Project Management and Benchmarking This course introduces the techniques of planning project management, benchmarking, and their applications to facility management. Includes space forecasting, scheduling and control of projects, and benchmarking studies. 3 credit hours
BC 6550 Design and Construction Processes This course offers a framework for use and application of design, contract, and performance documents for successful execution of various forms of integrated project delivery systems. 3 credit hours
BC 6650 Advanced Project Management A four-phased coverage of project management including organization, planning and scheduling, control, budgeting, and ending with project testing, evaluation, and termination. 3 credit hours
ARCH 6226 Green Construction

<p>This course focuses on the means, methods, strategies, and technologies to improve the energy efficiency and performance of buildings, and to reduce the environmental impact of buildings.</p> <p>3 credit hours</p>
<p>ARCH 6503 BIM Applications</p> <p>Survey of Building Information Modeling - its technologies exploration of new technologies to be applied and new procedures of project execution.</p> <p>3 credit hours</p>
<p>CEE 6190 Construction Field Engr</p> <p>Introduction to construction engineering techniques and practices including site excavation, shoring structures, heavy equipment, site layout, and temporary facility construction.</p> <p>3 credit hours</p>
<p>CEE 6504 Finite Element Methods</p> <p>Introduction to the element method with emphasis on analysis of solids and structures. One-, two-, and three-dimensional finite. Modeling, approximations, and errors.</p> <p>3 credit hours</p>
<p>CEE 6510 Structural Dynamics</p> <p>Vibration and dynamic response of linear and nonlinear structures to periodic and general disturbing forces, with and without damping effects. Wind and earthquake SDOF and MDOF effects.</p> <p>3 credit hours</p>
<p>CEE 6521 Reinfoc Concrete Members</p> <p>Behavior and design of RC members; ductility and inelastic response; deep beams; corbel and torsion design; column biaxial bending; shearwalls; effects of creep and shrinkage.</p> <p>3 credit hours</p>
<p>CEE 6523 Prestressed Concrete</p> <p>Principles and practice of prestressed concrete. Analysis and design of statically determinate and indeterminate beams, and one-way and two-way slabs; precast pretensioned, posttensioned.</p> <p>3 credit hours</p>
<p>CEE 6541 Earthquake Engineering</p> <p>Characteristics of earthquakes; design and rehabilitation of civil engineering structures for earthquake ground motion; code provisions; case studies.</p> <p>3 credit hours</p>
<p>CEE 6549 Structural Reliability</p> <p>Concepts and applications of probability and statistics for analysis of risk and reliability of structures subjected to natural and man-made hazards; stochastic load and strength modeling; probabilistic risk assessment; introduction to stochastic computational mechanics.</p> <p>3 credit hours</p>
<p>CEE 6551 Strength of Materials</p> <p>Study of advanced topics from mechanics of materials with application to structures. Typical topics: energy methods, failure theories, post-yield behavior, generalized bending and torsion.</p> <p>3 credit hours</p>
<p>COA 6010 Construction Ind History</p> <p>Addresses how today's construction industry is organized and its particular characteristics, how it evolved from early times and where it may be heading in the future.</p>

3 credit hours
COA 8625 Theories of Inquiry Introduction to research paradigms and their assumptions. The formulation of questions and frameworks of description, representation, analysis, interpretation, and data control. 3 credit hours
COA 8680 Performance Aspects Engineering analysis of building (sub) systems based on performance ontology. Criteria, metrics, and tools for performance aspect evaluations in different building technology domains. 3 credit hours
CP 6321 Transport Plan & Invest Review of transportation methods and how they interface with investment decisions. How transportation planners at the local, regional, state, and federal levels employ methods. 4 credit hours
CS 6491 Computer Graphics Mathematical/physical/perceptual principles and modeling/rendering techniques used to create, represent, display, and animate models of 3D shapes and their properties. 3 credit hours
CS 6754 Engr Database Mgt System Modeling and managing engineering information systems, integration of design and manufacturing functions in engineering product development, logical models of engineering product and processes. 3 credit hours
CS 7495 Computer Vision An introduction to computer vision and machine perception. An intensive study of the process of generating a symbolic description of the scene by interpretation of images(s). 3 credit hours
ECE 6258 Digital Image Processing An introduction to the theory of multidimensional signal processing and digital image processing, including key applications in multimedia products and services, and telecommunications. 3 credit hours
ECON 6150 Cost Benefit Analysis The application of economic, financial, and quantitative reasoning and tools to issues of resource allocation and policy, primarily in the public sector. 3 credit hours
ECON 6460 Industrial Organization This course examines modern theories of the firm, market power, and competitive strategy. Game theory is employed throughout the course. 3 credit hours
ISYE 6223 Human Decision Making Prescriptive and descriptive theories of human decision making are discussed/contrasted. Approaches to aiding human decision making are considered in context of these theoretical frameworks. 3 credit hours
ISYE 6231 Human Integrated Systems Analysis and design of complex work domains in technological environments. 3 credit hours

ISYE 6402 Time Series Analysis
Basic forecasting methods, ARIMA models, transfer functions. 3 credit hours
ISYE 6414 Regression Analysis
Simple and multiple linear regression, inferences and diagnostics, stepwise regression and model selection, advanced regression methods, basic design and analysis of experiments, factorial analysis. 3 credit hours
ISYE 6416 Computational Statistics
This class describes the available knowledge regarding statistical computing. Topics include random deviates generation, importance sampling, Monte Carlo Markov chain (MCMC), EM algorithms, bootstrapping, model selection criteria, (e.g. C-p, AIC, etc.) splines, wavelets, and Fourier transform. 3 credit hours
ISYE 6644 Simulation
Covers modeling of discrete-event dynamic systems and introduces methods for using these models to solve engineering design and analysis problems. 3 credit hours
ISYE 6650 Probabilistic Models
An introduction to basic stochastic processes such as Poisson and Markov processes and their applications in areas such as inventory, reliability, and queueing. 3 credit hours
ISYE 6679 Computational Methods
Strategies and techniques for converting optimization theory into effective computational procedures. Emphasis is on applications in linear, integer, and nonlinear programming; networks and graphs. 3 credit hours
ISYE 6761 Stochastic Processes I
Discrete time Markov chains, Poisson and renewal processes; transient and limiting behavior; average cost and utility measures of systems. 3 credit hours
ISYE 6762 Stochastic Processes II
Continuous time Markov chains; uniformization, transient and limiting behavior; Brownian motion and martingales; optional sampling and convergence. 3 credit hours
ISYE 6785 The Practice of QCF
Case studies, visiting lecturers from financial institutions, student group projects of an advanced nature, and student reports, all centered around quantitative and computational finance. 3 credit hours
ISYE 6795 Intro-Cognitive Science
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. 3 credit hours
ISYE 7401 Adv Statistical Modeling
Nonlinear models, logistic regression, loglinear models. 3 credit hours

ISYE 7405 Multivariate Data Analysis
Multivariate ANOVA, principal components, factor analysis etc. 3 credit hours
ME 6406 Machine Vision
Design of algorithms for vision systems for manufacturing, farming, construction, and the service industries. Image processing, optics, illumination, feature representation. 3 credit hours
MGT 6125 Strategic Management
Designed to provide a view of business organizations, with the focus on the total enterprise - the industry and competitive environment in which the organization operates. 2 credit hours
MGT 6126 Integrative Mgt Exper
IME is a team-based and project-based course that requires students to draw on all core skills areas for successful completion. 1 credit hour
MGT 6130 Managerial Economics
This course is designed to provide students with an understanding of basic economic concepts and an ability to apply these concepts to business decision-making and public policy analysis. 1.5 credit hours
MGT 6131 Macroecon Environ of Bus
This course is designed to provide future managers with an understanding of the underpinnings of macroeconomic analysis, including an understanding of the policy debates over alternative macroeconomic issues. 1.5 credit hours
MGT 6300 Marketing Management I
This course focuses on the activities of managers who make the everyday decisions that guide the marketing of goods and services. Students take the principles that they learn and apply them directly to solving relevant case problems. 3 credit hours
MGT 6350 Operations Management
This course focuses on the issues and techniques relevant to the management of the organization within and recognizing its strategic significance. 3 credit hours
PSYC 6018 Research Design
Introduction to basic principles and practices of empirical research in psychology. Covers both experimental and correlational methods and designs. 3 credit hours
PSYC 6019 Statistical Analysis I
Introductory treatment of descriptive and inferential statistics as applied to psychological research. 5 credit hours
PSYC 6020 Statistical Analysis II
Introductory treatment of inferential statistics, especially the general linear model, as applied to psychological research. 5 credit hours
PSYC 6750 Human-Computer Interact

Describes the characteristics of interaction between humans and computers and demonstrates techniques for the evaluation of user-centered systems.

3 credit hours

PSYC 7301 Multivariate Statistics

Foundations for multivariate analysis including properties of linear composite variables, multiple regression, multiple and partial correlation, MANOVA, factor analysis, multiple discriminant analysis, canonical correlation, etc.

3 credit hours

PSYC 8060 Sem Quantitative Psy

Presentation and discussion of quantitative approaches to psychology. Topics will vary, but might include neural networks, measurement theory, behavioral ecology, modeling, system dynamics, etc.

3 credit hours