



## **GRADUATE HANDBOOK**

Department of Industrial Engineering  
Clemson University

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## 1. INTRODUCTION

### 1.1. Welcome and Purpose of this Handbook

Welcome to the Department of Industrial Engineering 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 Industrial Engineering (IE), with the requirements, policies, and procedures involved throughout your graduate experience. The rules and regulations provided in this handbook govern our academic programs and outline the duties and responsibilities of graduate students in the department. These rules and regulations, developed over the years in conjunction with the Graduate School, have proven beneficial for both students and faculty in the department. Additionally, 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 supplementary to, and subordinate to, those described in the Graduate School Policies and Procedures, which you can find through the Graduate School office in E-108 Martin Hall or at the following link: <https://www.clemson.edu/graduate/students/policies-procedures/index.html>. Any inconsistencies within this handbook or between this handbook and the Graduate School Policies and Procedures should be brought to the attention of the Graduate Coordinator. The Graduate School website also provides additional information about the community, the University, and resources for students (e.g., housing, events, and activities).

### 1.2. Contact Information

**Dr. Kevin Taaffe**

Professor and Department Chair  
Email: [taaffe@clemson.edu](mailto:taaffe@clemson.edu)  
Office: 100B Freeman Hall  
Phone: 864-656-0291

**Dr. Kapil Chalil Madathil**

Professor and Graduate Coordinator  
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**Dr. Raul Chavez-Negrete**

Professor of Practice and MEng Program Coordinator  
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Accountant  
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Office Manager  
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**Casey Fenton**  
Graduate Student Services Coordinator  
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Phone: 864-656-4785

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Student Services Manager  
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Phone: 864-656-0795

**Susan Long**  
Undergraduate Advisor  
Email: [sllong@clermson.edu](mailto:sllong@clermson.edu)  
Office: 100E Freeman Hall  
Phone: 864-656-1227

### ***1.2.1. Contacts for Common Issues***

- For computer issues: Email [ithelp@clermson.edu](mailto:ithelp@clermson.edu)
- For keys and administrative matters: Contact Denise Lennox
- For academic issues or curriculum inquiries: Contact Dr. Kapil Chalil Madathil  
For graduate forms and general graduate program questions: Contact Mr. Casey Fenton

## 2. Prospective Students

### 2.1. Applying to IE at Clemson

The online application is at <https://www.clemson.edu/graduate/admissions/index.html>. In the banner on the left, there is an icon titled “Apply Now” that will get you started. Once the online application is complete and the application fee is paid, students can check the status of the application process by clicking on the icon “Application Status Check” and following the instructions.

Admission decisions are made independently of funding decisions; hence, gaining admission does not imply that funding is available or will be offered. The Graduate School officially notifies students of admissions decisions, not the Department of Industrial Engineering or the IE Graduate Coordinator. The following sections describe various aspects of the application process.

### 2.2. Admission Requirements

Minimum requirements to be considered for admission generally follow those of the Graduate School (see Graduate School Admission at the following link: <https://www.clemson.edu/graduate/admissions/index.html>). Minimum requirements include 1) at least a four-year bachelor’s degree from an institution whose scholastic rating is satisfactory to the University and 2) a high quality of previous academic record. The GRE is not required for Ph.D. and MS applications. Please note that you may include unofficial or official GRE scores in your application file if you believe it will strengthen your application. Please note that your chances for admission or assistantships will not be impacted by not including GRE scores. International students are required to furnish satisfactory scores on either the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) exam.

It is expected that applicants to the IE graduate program will have earned baccalaureate degrees in engineering, physical sciences, mathematics, or other related majors with strong mathematical backgrounds. Entering graduate students are assumed to have competence in calculus, linear algebra, and probability/statistics.

Upon receipt of all admission materials, the Graduate Committee in IE will evaluate the application for admission. Students who are judged to have the background and motivation to be successful in the program are accepted and affirmed by the Graduate School. There are no minimum score requirements. However, students admitted to the IE Graduate Program typically have:

- An undergraduate grade point average (GPA) of at least 3.0 or above (on a 4.0 scale). Students with a master’s degree typically have a GPA above 3.5 in their graduate courses.
- Scores on the Graduate Record Exam (GRE) that exceed 160 (old score of 700) on the Quantitative Reasoning section.
- Scores on the Test of English as a Foreign Language (TOEFL) that exceed 100 (iBT) or 600 (PBT) and 7.0 (IELTS) for international students.

If the student's performance on these measures is not consistent with the guidelines, it is important that the reference letters and the statement of purpose provide the Graduate Committee with additional information as to why the student should still be considered for admission to the IE Graduate Program.

Completed applications received before the deadline posted on the IE Graduate Program website will receive full consideration. You may find some helpful information about admissions from the following websites:

- <https://www.clemson.edu/cecas/departments/ie/academics/graduate/faq.html>
- <https://www.clemson.edu/graduate/admissions/index.html>

### **2.3. Transfer Credits**

Clemson University policy does not allow automatic transfer of graduate credit. Students with graduate credit earned at another institution, in another department at Clemson University, or earned before admission to this program must have prior work evaluated for transfer credit by the Graduate Program Coordinator. The request must be in writing for each course or credited activity to be transferred. An official transcript, catalog description, and syllabus or other supporting documentation must accompany each request. Grades earned for courses taken at institutions other than Clemson University will not be included in the student's academic GPA. It is the student's responsibility to supply all required documentation to the Graduate Program Coordinator.

Transfer credit will not be awarded for research, internships, courses graded pass/fail, or coursework in which the grade received is 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 Policies and Procedures for more information regarding transfer credits

<https://www.clemson.edu/graduate/students/policies-procedures/index.html>.

### **2.4. Direct Admission to the Ph.D. Program**

Students with no previous graduate degrees can be considered for direct admission to the Ph.D. program (bypassing the M.S. program) if they have exceptional academic credentials with a bachelor's degree in a field approved by the department.

### **2.5. Duplication of Degrees**

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

### **2.6. Costs**

For tuition and fees, see <https://www.clemson.edu/graduate/finance-tuition/index.html>. For more information about academic costs, financial aid, and making payments, contact

the Office of Student Financial Aid (G-01 Sikes Hall, 864-656-2280) or the Bursar's Office (G-08 Sikes Hall, 864-656-2321).

## **2.7. Departmental Support - Assistantships and Hourly Funding**

Award decisions are based on academic record, test scores, statement of purpose, and letters of recommendation. Students who are admitted to our Ph.D. program are provided with teaching or research assistantships for the first year of their graduate studies. Although not guaranteed, Ph.D. students who successfully make progress toward their degree and find a dissertation advisor typically continue to receive an assistantship. M.S. students should be prepared to finance their entire program of study. Occasionally, some of our M.S. students who perform at a high level after enrolling at Clemson are funded in later semesters through either hourly employment or an assistantship. M.S. students may be eligible for funding if they are (1) enrolled in full-time graduate studies, (2) in high academic standing, and (3) making satisfactory progress toward their degree.

Tuition and fees for students receiving an assistantship are combined into a reduced flat fee. To receive this reduced fee in a particular semester, a qualified student must be on the department payroll by the end of the second week of that semester. Students with assistantships may choose to defer tuition and fees. This means that fees and tuition costs will be deducted from the first six full paychecks of the semester.

Teaching assistantships, research assistantships, and hourly funding are awarded on a semester-by-semester basis and are not guaranteed in subsequent semesters. There may be other employment opportunities for graduate assistants or other positions around campus (e.g., food service, campus police) after enrollment.

### **2.7.1. Applying for Social Security Number**

If you are an international student receiving an assistantship, your first step in the employment process is SEVIS Check-In. This step can be completed online at <https://www.clemson.edu/campus-life/campus-services/international/student-arrival/SEVIS%20Check-In.html>. Once that step is completed, you should then schedule a meeting with the Accountant in 100D Freeman Hall. You will be provided with an Employment Verification Letter that you will need when applying for a Social Security Card (SSC). You should then go to the Social Security Administration in Anderson, SC, for a Social Security Number or meet with the Social Security Administration representative on campus on the dates indicated by the Graduate School. Once you have your signed Social Security card, you will schedule a meeting with Human Resources, who will complete the necessary paperwork to get you on payroll. You can use this link to make an appointment <https://www.clemson.edu/human-resources/contact/index.php?about=International> or call them at 864-656-2000. When you go to your meeting, be sure to take your SSC and the following:

- U.S. Visa
- Unexpired foreign passport
- I-94
- DS-2019 (J1 visa) / I-20 (F1 visa)

## **2.8. Housing and Area Information**

Information about housing, transportation (CAT bus and Greenville LINK), and student life is provided on the Clemson University Graduate School website <https://www.clemson.edu/graduate/>.

## **3. ENROLLED STUDENTS**

### **3.1. Orientation**

Clemson University orientation for new graduate students is conducted online via Tiger Training; this is mandatory for all new graduate students. College and department trainings will be announced to new students prior to arrival through Clemson email addresses.

### **3.2. Student Responsibilities**

The faculty members in IE expect you to approach your graduate study in a professional manner. Graduate studies should be treated as a job, and as such, you should expect to work focused hours each week on your studies and research. It should also be noted that graduate students may not be allowed all breaks/holidays afforded to undergraduate students.

### **3.3. 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 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. The Department of Industrial Engineering takes academic integrity very seriously and pursues every option available to maintain our high academic standards, including writing up student offenses and following through with grade and/or dismissal sanctions if warranted. Students can become familiar with the rules and procedures by reading the Graduate School's Policies and Procedures guidelines (<https://www.clemson.edu/graduate/students/policies-procedures/index.html>).

### **3.4. Maintaining Academic Standing**

A graduate student must maintain a minimum overall grade point average (GPA) of 3.0 for all courses taken in order to graduate from Clemson University. If at any time you fail to satisfy this requirement, you may be automatically placed on probation and directed to work with Graduate Student Services and Program Coordinators to develop a plan for successfully raising your GPA.

### **3.5. Other Important Graduate School Policies and Procedures**

For other graduate school policies and procedures, please see the Graduate School Policies and Procedures webpage at <https://www.clemson.edu/graduate/students/policies-procedures/index.html>. Here you can find information about the policies and regulations related to incomplete coursework, enrolling in a class on a pass/fail basis, auditing courses,

withdrawing from a course, enrollment and leave of absence policies, as well as the procedures for withdrawing from the University.

### **3.6. 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. For more detailed information on this topic, please see the Graduate School Policies and Procedures webpage at the following link:  
<https://www.clemson.edu/graduate/students/policies-procedures/index.html>.

### **3.7. 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, Computing, and Applied Sciences 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.

### **3.8. Departmental Resources and Responsibilities**

#### **3.8.1. Computer Access and Use**

Graduate students will have access to computers in research labs, open departmental labs, and in CCIT computer labs. Any problems with computers in department labs should be reported to [ithelp@clemson.edu](mailto:ithelp@clemson.edu). CCIT offers numerous instructional short courses. Visit their website at <http://ccit.clemson.edu/training/> for details.

#### **3.8.2. Email**

Email is the most common medium used by the department and the University to communicate with you. Many events and information important to your success in the program are announced via email. It is very important, and you are expected, to check your email regularly (at least once a day). If you are requested to respond, you should do so in a timely manner. There are resources available at <http://www.clemson.edu/ccit/> for accessing Clemson emails on mobile devices. Resources are also available for initializing Google Apps and g.clemson email addresses on the CCIT website. We do not recommend forwarding emails from your Clemson account to a private email account. If you forward emails from your Clemson account to a private account such as Gmail, you take full responsibility for not

receiving important or time-sensitive information due to malfunctions with the private account.

### ***3.8.3. Mailboxes and Personal Mail***

Each Ph.D. student is assigned a mailbox in Freeman 278, which you should check regularly. All personal mail should be directed to your home address. The department is not to be used as your mailing address. The department assumes no responsibility for personal deliveries to Freeman Hall.

### ***3.8.4. Keys***

You will be issued keys to areas where you have been granted access and TigerOne card access to the building's entrance doors. Keys for other areas like research laboratories will be issued upon obtaining permission from the faculty member in charge of the lab. Students leaving the University through graduation or for an extended period of time for any reason must return all keys to the Office Manager. We recommend that you give your keys to the Office Manager any time you leave the country. A fee will be charged for any unreturned key.

The key(s) issued to you are for your use exclusively. You must never loan keys to anyone else, not even another graduate student. Failure to observe this rule may result in revocation of your key privilege. Unauthorized possession of a key to a University building is prohibited by South Carolina law. You are responsible for locking all rooms to which you have gained access with a key.

### ***3.8.5. Building Security, Maintenance***

Freeman Hall is normally locked after 9:00 pm 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. Should you discover a building problem, report this to the Office Manager. If something major is found wrong outside of normal office hours, inform the Graduate Coordinator and/or the Department Chair after you have called the Clemson University Police Department (CUPD) at (864) 656-2222.

### ***3.8.6. Use of Departmental Office Resources***

Graduate students employed as teaching or research assistants may use the departmental copier and fax for official business associated with their employment. Use for any other purpose is strictly prohibited. The department does not furnish office supplies to graduate students for personal use. All use of office supplies while conducting contract-related research or as part of a teaching assistantship must be authorized by the appropriate faculty member. See the Accountant Fiscal Analyst for all requests of this nature.

### ***3.8.7. Student Offices/Desks***

It is the goal of the department to provide a desk for each graduate student. However, due to the limited available space, it may not be possible to accommodate each student. Therefore, a priority system is used, which first assigns a desk to doctoral students,

graduate assistants, and graduate fellows, then to unsupported master's students. New students should see the Office Manager regarding a desk assignment.

### **3.8.8. Student Photos**

At the beginning of each semester (as part of the new student orientation), professional headshots of matriculating Ph.D. students are taken. They may be used for the departmental website, promotional materials and articles, and your own professional and educational use.

### **3.8.9. Student Travel and Awards**

A student's faculty supervisor or research advisor will inform students when travel is required as part of their duties in the department and will provide students with details of the rules and regulations that are applicable. The student and the faculty are responsible for obtaining the funding to support the travel. Note that there are several opportunities for awards and scholarships to support professional travel.

The Graduate Student Government (GSG) makes awards to full-time graduate students toward their attendance at conferences and other professional development events. See the GSG website for application information (<https://gsg.people.clemson.edu/>).

The IE Department has competitive awards to partially support the travel of full-time graduate students toward their attendance at conferences. A student is eligible to receive at most one IE travel award per academic year. There will be a formal announcement of the application process for the award in each fall and spring semester.

### **3.8.10. Inclement Weather**

Cancellation of classes due to inclement weather is determined by University Administration and announced through Clemson's website, CU Safe Alert texts (opt-in service), local radio, and television stations. University Administration attempts to alert students of any disruption of scheduled classes by 7 a.m. Separate announcements are made for the main campus and other Clemson campuses.

## **3.9. Campus Facilities and Resources**

### **3.9.1. Emergencies**

Call 9-1-1 (transfers to CUPD) or CUPD directly at 864-656-2222 for all major emergencies: fire, medical, police.

### **3.9.2. Graduate Student Government**

The Graduate Student Government (GSG) is a University-wide organization of all graduate students, 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 Policies and Procedures

(<https://gsg.people.clemson.edu/>) for more information or contact the GSG office at 864-656-2697. Your active participation in the Graduate Student Government is encouraged.

### **3.9.3. 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 have access to services from the Counseling and Psychological Services program (CAPS), located in Redfern Health Center. Visit the CAPS website at <https://www.clemson.edu/campus-life/student-health/caps/index.html> or call them at 864-656-2451 to learn more.

### **3.9.4. Clemson University Ombuds**

The ombuds is an independent, confidential resource that assists faculty, graduate students, and postdoctoral students in resolving problems, complaints, and conflicts when standard procedures have not been effective. The Ombuds Office serves as a central information source on policies, procedures, and regulations affecting faculty, graduate students, and postdoctoral students. The office refers individuals to the appropriate people or offices capable of resolving issues or handling appeals at the lowest possible level. Where appropriate, the ombuds can facilitate communication or mediate between parties.

The ombuds is committed to ensuring that faculty, graduate students, and postdoctoral students receive fair and equitable treatment within the University system. They provide an independent perspective in an informal and confidential environment. The ombuds will not identify you or discuss your personal concerns with anyone without your permission. Private, confidential meetings can be arranged at your convenience, and all communications will be treated with strict confidentiality to the extent permitted by law.

The ombuds works toward resolutions based on principles of fairness. They are not an advocate for faculty, administration, or students, nor are they an agent of the University. The Office of the Ombuds is available to assist faculty members, graduate students, and postdoctoral students who:

- Need guidance in resolving a problem or concern related to the University;
- Need information about policies or procedures;
- Need someone to mediate between individuals or within the University;
- Feel the University has made an error in a particular case;
- Feel they have been victims of harassment or discrimination;
- Are unsure about which University policies, procedures, or regulations apply to a given situation;
- Have specific academic problems that cannot be resolved through regular University procedures;
- Feel they have been treated unfairly;
- Have a problem that requires negotiation or help facilitating communication between parties; and/or
- Believe that a University policy, procedure, or regulation has been applied unfairly or incorrectly.

- Additional information about the ombuds' standards, practices, confidentiality, office location, and contact information is available on the University Ombuds webpage (<https://www.clemson.edu/administration/ombuds/index.html>).

Students may also contact the Dean of Students or the Graduate School for assistance with issues such as crisis or emergency response, general support and advice, counseling and referral services, student conduct advising, and extended absences. These offices provide resources and guidance to help students navigate personal and academic challenges. For more information, please visit the Dean of Students website at <https://www.clemson.edu/studentaffairs/find-support/ds/index.html> or the Graduate School website at <https://www.clemson.edu/graduate/index.html>.

### **3.10. Professional Development**

There are several 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. In addition, the Graduate School provides professional development information on the Grad 360 website (<https://grad360.sites.clemson.edu/>).

#### **3.10.1. 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 Career Center hosts career fairs each fall and spring and offers workshops on various career-related topics. Information is also provided about internships and part-time and summer work. For more information, see their website at (<http://career.clemson.edu>) or call 864-656-6000.

#### **3.10.2. Professional and Student Organizations**

Graduate students are encouraged to join one of our three student organizations associated with industrial engineering's professional societies:

- Institute of Industrial and Systems Engineers (IISE)
- Institute for Operations Research and the Management Sciences (INFORMS)
- Human Factors and Ergonomic Society (HFES)

### **3.11. Graduate School Deadlines and Forms**

The Graduate School sets deadlines according to the academic calendar for the semester in which you plan to graduate. Specific deadline dates for Graduate School forms can be found at <https://www.clemson.edu/graduate/students/deadlines.html>. For all other deadline-related questions not answered in this document, please see the Graduate Student Services and/or Program Coordinator. In general, any form that is required to be submitted to the Graduate School should also be sent to the Graduate Student Services Coordinator so that the department has it on file.

All graduate students should have an advisory committee and fill out a Plan of Study. Every student's advisory committee must have a majority of committee members whose primary faculty appointment is in the Department of Industrial Engineering.

### **3.11.1. Committee Selection**

- Students pursuing the M.S. degree via the non-thesis option will have a single-member committee comprised of the Graduate Coordinator.
- Students pursuing the M.S. degree via the thesis option should have a minimum of three committee members, a majority of whom must have primary appointments in the IE department. Students submit their GS2 during their second semester. Their thesis advisor(s) will serve as the committee chair/co-chairs, and the students should consult with their advisor(s) on the selection of other committee members.
- Ph.D. students should have a minimum of four committee members. Upon successfully completing the Qualifying Exam, Ph.D. students must inform the Graduate Program Coordinator of their intended faculty advisor within 30 days. The Graduate Program Coordinator will inform the student by email who the other three committee members should be for the initial form GS2 submission (this is a placeholder submission). Once the student's final research committee is determined (often by the Comprehensive Exam), the student will re-file the GS2 to properly identify the advisory committee.

### **3.11.2. Plan of Study**

- When filling out the form, it is very important that the entire course name be typed out.
- All committee members will review the courses and research listed for accuracy before approval is granted.
- As soon as the MS student reaches 30 graduate credit hours completed on their GS2, the Graduate School assumes the student is graduating.
- Detailed information is available at (<http://www.clemson.edu/graduate/students/gs2-hints.html>).

*Note to all graduating Ph.D. and MS Thesis students:* Please make sure your advisory committee chair completes your GS7M or GS7D forms, as the IE department will submit these forms to the Graduate School only once all required signatures are obtained.

### **3.11.3. General Thesis and Dissertation Guidelines**

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

### **3.11.4. Planning**

Task planning is a very important part of any research program. The deadlines for tasks depend on the date of anticipated graduation and are presented in the Graduate School Policies and Procedures. A list of the deadlines is also available from the Graduate School

website, <https://www.clemson.edu/graduate/students/deadlines.html>. 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 report/thesis/dissertation after leaving the University.

### **3.12. 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 Department.
- Be sure that all equipment and supplies which you have drawn are returned to stock.
- Ensure that any portion of the lab or office that you occupied is clean and ready for another occupant. Please leave your lab or office in the condition you would have liked to have found it originally.
- Return all borrowed materials (books, journals, etc.) to their appropriate location.
- Inform the Graduate Coordinator that you are leaving and have complied with all regulations and schedule an exit interview.

### **3.13. Appeals Process**

Appeals for waivers to any of these policies and procedures are made to the Graduate Committee. You must outline the nature of your appeal and the desired outcome in writing and submit the document to the Graduate Coordinator. A meeting of the Graduate Committee will be held, and the decision will be communicated to you in writing.

Any appeals for coursework to count towards a concentration must be made prior to the first day of classes in a given semester in order for the Graduate Committee to render a decision before the Add/Drop deadline for that semester.

### **3.14. Financial Support**

The Department of Industrial Engineering understands that financial aid is of prime importance to many students. Although not guaranteed, Ph.D. students who successfully make progress towards their degree and find a dissertation advisor typically continue to receive an assistantship. Unfortunately, very few entering M.S. students receive funding from the Department. Occasionally, some of our M.S. students who perform at a high level after enrolling at Clemson are funded in later semesters through either hourly employment or an assistantship. Teaching assistantships, research assistantships, and hourly funding are awarded on a semester-by-semester basis. There may be other employment opportunities for graduate assistants or other positions around campus (like food service, campus police, etc.) after enrollment.

The following information provides more details on financial support should you receive an offer at any point in your time at Clemson. Please read this very carefully so that you fully understand all requirements of the appointment before you accept the offer.

### ***3.14.1. Assistantships and Fellowships***

Graduate assistantships are available in teaching and research. Graduate teaching assistantships include graders, laboratory assistants/instructors, and teachers of record. These may be in the form of  $\frac{1}{4}$ -time (10 hours per week),  $\frac{1}{2}$ -time (20 hours per week), or  $\frac{3}{4}$ -time (28 hours per week) appointments. Graduate research assistantships are generally made by individual faculty members to conduct research on specific projects. These may also be  $\frac{1}{4}$ -time,  $\frac{1}{2}$ -time, or  $\frac{3}{4}$ -time appointments.

Fellowships are available from organizations outside Clemson University. Information on these opportunities is available from the department and from the Graduate School website (<https://www.clemson.edu/graduate/finance-tuition/fellowships.html>).

### ***3.14.2. Hourly Employment***

On occasion, a graduate student may be employed on an hourly basis by a faculty member or by the Department. The assignment can be a research position with a faculty member, an hourly grading position to support classroom instruction, or other Department needs. Hourly students will complete timesheets every pay period and record the days and times they worked on their assigned tasks. Due to the procedure in which timesheets are currently used, it may be necessary to implement any pay reductions in the pay period following the one in which the work deficiency occurred.

### ***3.14.3. Minimum Enrollment***

A minimum enrollment is required for appointment as a graduate assistant. During the academic year, the minimum enrollment is nine semester hours for all graduate assistants. Minimum enrollment in the summer sessions is three semester hours per session. An assistantship may be withdrawn at any time for failure to maintain satisfactory enrollment status. There is no minimum enrollment requirement for hourly employment.

### ***3.14.4. 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.

### ***3.14.5. Paydays***

Employees receive pay two times per month, for the period ending the 15th and the period ending on the last day of each month. When you go on the payroll for the first time, you will have a two-week lag before you will be paid. This “lag pay” is paid out after your termination from your position.

### ***3.14.6. 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. Students can view their pay stub and other employment-related information on HR Self Service (View Paycheck, Benefits, etc.). From the menu within this system, you can review paychecks, acquire tax information, and access other employment information.

#### **3.14.7. Work Injury Protocol**

Should you be injured during 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.

#### **3.14.8. Workload**

The normal ½-time graduate assistantship workload is 20 hours per week (average). As described above, students are sometimes hired for a different number of hours under appropriate circumstances. You should be aware of both your academic and work obligations and are encouraged to discuss any problems with your supervisor.

#### **3.14.9. Work Product**

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

#### **3.14.10. Reduction of Pay**

Normally, your agreed-upon workload will be compensated as hours worked for each payroll period. However, if the amount of work you perform consistently deviates below the required workload, your pay may be reduced accordingly by your supervisor. For hourly employment, it may be necessary to implement any pay reductions in the pay period following the one in which the work deficiency occurred. Pay may also be withheld from students who violate the vacation policy (see below).

#### **3.14.11. Vacation Policy**

As a rule, graduate assistants and hourly employees do not accrue paid vacation time. Your work timeframe should be based on enrolled credit hours and the terms in your assistantship offer letter. In the case of events that would require unpaid leave, please refer to the graduate school policies and procedures:  
(<https://www.clemson.edu/graduate/students/policies-procedures/index.html>).

#### **3.14.12. 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 Graduate Program Coordinator 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.

### **3.14.13. Holidays**

Graduate students are entitled to take as holidays the days on which the University is officially closed (see them at <http://www.clemson.edu/employment/benefits/holiday.html>).

### **3.14.14. Ph.D. Student Family Leave**

Ph.D. students can request a six-week, paid parental leave where their responsibilities to their department (if in a TA position) or advisor (if in an RA position) are temporarily paused. Students should request leave by reaching out to the graduate program coordinator and the graduate student services coordinator. Students should request leave at the beginning of the semester they intend to take it, so that arrangements can be made to cover their responsibilities. If the student is requesting leave prior to completion of their qualifying exam, the Department will allow them to take the qualifying exam at the end of the next academic semester.

### **3.14.15. Ph.D. Student Bereavement Leave**

Ph.D. students can request two weeks of paid bereavement leave if a member of their immediate family passes away.

### **3.14.16. Ph.D. Student Continued Support**

The Department of Industrial Engineering understands that financial aid is of prime importance to many students. As stated in the department's offer letters, Ph.D. students who *successfully make progress towards their degree*, perform *satisfactorily in their duties*, and find a dissertation advisor will continue to receive an assistantship during the academic year for at least four years.

The criteria for "*Successfully making progress towards their degree*" and "*Performing satisfactorily in their duties*" are defined as follows:

*Successfully making progress towards their degree:*

1. Students with assistantships must maintain a minimum GPA of 3.0.
2. Graduate assistants are required to be enrolled full-time.
3. Students must adhere to the Ph.D. degree progression timeline as outlined in the graduate handbook as listed in Section 4.5.5

*Performing satisfactorily in their duties:*

Students must receive an acceptable performance rating in the end of the semester evaluation form

1. they must achieve either a "*Meets Expectations*" or "*Exceeds Expectations*" in the overall performance metric and

2. receive a recommendation for reappointment, as documented in the Graduate Assistant Evaluation form ([https://media.clemson.edu/graduate/website/fac-staff/ga1\\_form\\_fillable.pdf](https://media.clemson.edu/graduate/website/fac-staff/ga1_form_fillable.pdf))

#### **4. THE DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE**

The Doctor of Philosophy is the highest academic degree offered. The Ph.D. program emphasizes the scientific and analytical foundations of industrial engineering, as well as the knowledge required for practice at the highest professional levels. In addition to formal coursework, a Ph.D. student devotes significant time to independent study, participation in seminars, and preparation of a dissertation based on independent and original research. The basis for granting the Ph.D. includes:

- A grasp of the subject matter contained in the broad field of industrial engineering.
- Competency to plan and conduct independent and original research that contributes to knowledge in a focused area of industrial engineering.
- The ability to adequately and professionally communicate in oral and written form.

##### **4.1. Summary of Ph.D. Degree Requirements**

Pursuing a doctoral degree involves the following minimum requirements:

- It is mandatory for a Ph.D. student to have a Committee Chair within 30 days after the successful completion of the Qualifying Exam. The Committee Chair must have an appointment in the Department of Industrial Engineering at Clemson.
- If a student wishes to continue in a Ph.D. program after obtaining an MS from the IE Department at Clemson University, or wishes to transition from an MS student to a Ph.D. student, the student must complete an application to the Ph.D. program. The application includes a CV, statement of purpose, and three letters of recommendation. This includes support from at least one faculty member willing to serve as the Committee Chair. If admitted, the student needs to submit a GS-14 or GS2-14.
- Completing at least 18 credits of doctoral research (IE 9910), exclusive of any research credits earned at the master's level.
- Completing at least 12 credits of coursework, exclusive of IE 9910 research credits.
- Completing a minimum of:
  - 60 semester credit hours of graduate coursework (including IE 9910 credits) beyond a baccalaureate degree; or
  - 30 semester credit hours of graduate coursework (including IE 9910 credits) beyond a master's degree.
- Passing all Doctoral Examinations.
- Satisfying the University's degree requirements as addressed in the Graduate School Policies and Procedures.
- At least one-half of the total graduate credit hours listed on the GS2, exclusive of any dissertation research, must be selected from courses numbered 8000 or above.

##### **4.1.1. 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 University faculty and under the direct advisement of your Committee Chair 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 15 hours of graduate credit, including research credit hours (9910), on the Clemson University campus in a continuous 12-month period. Once the 12-month period residency requirement is satisfied, it is expected that students pursuing a Ph.D. in IE will remain on campus and work closely with their research advisor. Should it become necessary for a student to conduct research off-campus or take a leave of absence, the student is required to:

1. Enroll in a minimum of 3 hours (9 if on assistantship) every fall, spring, and summer semester.
2. Develop a written plan describing how degree progress will continue to be made during the time away from campus and how regular contact and communication with the research advisor will be maintained.

This written plan must be approved by the student's research advisor and the Graduate Program Coordinator before submission to the Graduate School.

#### **4.1.2. Coursework Restrictions**

Students in the Ph.D. program cannot enroll in courses associated with the Master of Engineering (MEng Online) Program. These courses include IE 8500-8590.

#### **4.2. Breadth Requirement**

Although the Ph.D. degree in Industrial Engineering (IE) at Clemson requires specialization in either Human Factors (HF) or Operations Research (OR), students must also acquire a breadth of knowledge in the industrial engineering discipline. This breadth will facilitate collaborative research opportunities for IE students and make them more versatile in their careers after graduation. The breadth requirement consists of two components: (1) enrolling in the IE Ph.D. Seminar course for the first fall semester and (2) completing the course-based breadth requirement.

All Ph.D. students are expected to register for IE 8900 Ph.D. Seminar during the fall of their first full academic year on campus. This is a 1-credit course and will feature research presentations by external speakers in both OR and HF, as well as by Clemson IE faculty. This seminar will provide students with a breadth of knowledge about the types of research the IE discipline addresses. It will also help first-year Ph.D. students identify a research advisor by introducing them to each Clemson IE faculty member. Ph.D. students are encouraged to continue actively participating in the seminar series beyond their first semester.

For the course-based breadth requirement, HF Ph.D. students should take:

- IE 8030 Engineering Optimization and Applications, which covers deterministic OR, including linear programming and modeling.

For the course-based breadth requirement, OR Ph.D. students should take:

- IE 8000 Human Factors Engineering

The course-based breadth requirement can be satisfied by one of the following mechanisms:

1. By taking the corresponding IE course and earning a C or better (or “pass”).
2. Via allowable substitutions of those classes taken at Clemson.
3. By petition to the Graduate Committee.

The petition mechanism can be used to satisfy a maximum of two classes. These classes must be taken at the graduate level.

#### Important Note

Breadth requirement courses must be completed before the student takes the comprehensive exam.

#### **4.2.1. Substitutions for Breadth Requirement Courses**

IE 8030 is considered to be a Master’s level introductory course to deterministic OR (LP, modeling). If a student has prior knowledge in these areas, one of the following courses would be considered a suitable alternative:

- IE 8600 Dynamic Programming
- IE 8800 Advanced Methods of Operations Research
- MATH 8100 Mathematical Programming
- MATH 8110 Nonlinear Programming
- MATH 8130 Advanced Linear Programming
- MATH 8140 Network Flow Programming
- MATH 8160 Network Algorithms and Data Structures

IE 8090 is considered to be a Master’s level introductory course to probability and statistics. If a student has prior knowledge in these areas, one of the following courses would be considered a suitable alternative:

- MATH 8030 Stochastic Processes
- MATH 8170 Stochastic Models in Operations Research I
- MATH 8180 Stochastic Models in Operations Research II

The student has the option to appeal to the Graduate Committee for approval of a course not listed on either approved substitution list.

#### **4.3. Depth Requirement**

Beyond the breadth requirements, all Ph.D. students must meet their depth requirements. The depth requirement ensures that Ph.D. students acquire a depth of knowledge in their general research areas.

The depth requirement for Human Factors Ph.D. students includes the following five courses:

- IE 8000 Human Factors Engineering
- IE 8020 Design and Analysis of Human-Computer Systems
- IE 8060 Occupational Biomechanics and Physical Ergonomics
- IE 8080 Research Design and Analysis for Human Factors Engineering\*
- IE 8150 Research Methods in Ergonomics

\*The Data Analysis course (MATH 8050) is a prerequisite for IE 8080. Typically, all new Ph.D. students must enroll in it during the Fall semester of their first year. However, if a student's transcript shows evidence of a background in statistical methods, they may be eligible for an exemption. In such cases, students should contact the faculty member teaching IE 8080 in that semester. With approval, they may enroll in IE 8080 without completing MATH 8050.

The depth requirement for Operations Research Ph.D. students includes the following four courses:

- IE 8700 Advanced Models and Methods in Linear and Integer Programming
- IE 8780 Foundations of Probability for Industrial Engineering
- IE 8800 Advanced Methods of Operations Research
- IE 8880 Advanced Probabilistic Methods

#### **4.4. Suggested First-Year Ph.D. Student Course Plan (Required Courses)**

##### **4.4.1. Human Factors students**

- Fall (9 hours) - IE 8000, IE 8060, & MATH 8050
- Spring (9 hours) - IE 8020, IE 8080, & IE 8150
- 2<sup>nd</sup> Fall - IE 8030

##### **4.4.2. Operations Research students**

- Fall (9 hours) - IE 8700, IE 8780, and a 3rd course (suggested: a 6000-level course outside IE)
- Spring (9 hours) - IE 8800, IE 8880, and a 3rd course (suggested: a 6000-level course outside IE)
- 2<sup>nd</sup> Fall - IE 8000

#### **4.5. Doctoral Examinations**

Doctoral students must successfully complete three examinations: the Qualifying Examination, the Comprehensive Examination, and the Doctoral Dissertation Defense.

##### **4.5.1. Qualifying Examination**

All Ph.D. students must take a written Qualifying Exam at the end of their first year of study in May. Students starting the Ph.D. program in January of year  $n$  are expected to sit for the Qualifying Exam no later than May of year  $(n+1)$ , 16 months later. This exam assesses the student's depth of advanced knowledge in their chosen area of human factors or operations research. The Qualifying Exam is based on core topics provided at the start of the Ph.D. program and lasts six hours: three hours in the morning and three in the afternoon. Students may need additional knowledge beyond their coursework to master these topics.

The Human Factors exam tests core knowledge of human factors principles, theory, methods, and statistics. The Operations Research exam includes two parts: deterministic operations research and stochastic operations research. For both exams, students may bring two double-sided sheets of notes (8.5" x 11"), one for each section.

The outcomes of the exam are as follows:

1. Pass both sections = exam passed; student may continue in the Ph.D. program.
2. Fail both sections = exam failed; student is dismissed from the Ph.D. program and may work with the Graduate Coordinator to change to a Master of Science in IE.
3. Pass one section, fail one section = student may retake the failed section in mid-July, approximately two months after the initial attempt.
  - a. Pass the retaken section = exam passed; student may continue in the Ph.D. program.
  - b. Fail the retaken section = exam failed; student is dismissed from the Ph.D. program and may work with the Graduate Coordinator to change to a Master of Science in IE.

#### **4.5.2. Comprehensive Examination**

The Comprehensive Examination tests a student's ability to demonstrate deep knowledge in their chosen area, beyond the specific dissertation topic. This exam should be attempted after completing the breadth requirement but no later than the third fall semester. If a student fails the first attempt, a second attempt may be granted within six months. Failure on the second attempt will result in dismissal from the program. The Comprehensive Exam consists of a written portion and an oral portion.

The student has two options to pass the written portion:

1. Prepare a research prospectus
2. Prepare a dissertation proposal

If option 1 is chosen, the student will later submit a dissertation proposal document to the Advisory Committee. Selection and timing should be approved by the Advisory Committee.

##### Written Portion

The student must submit a research document, with format and scope decided by the Advisory Committee. Examples include a research prospectus, dissertation proposal, or a journal paper, provided there are significant, unanswered research questions. A research prospectus is typically 10-15 pages long and may include an abstract, introduction, literature review, research questions, and significance of the research. A dissertation proposal typically contains a few chapters, including an in-depth literature review, preliminary findings, and proposed research questions.

Within 7-10 days after submission, the Advisory Committee will release a set of written examination questions, due within 10 days.

#### Oral Portion

Within 7-10 days after submitting answers to the written examination, the student will take a two-hour oral exam. It includes a presentation of the research ideas in their document, followed by questions from the Advisory Committee.

#### **4.5.3. Doctoral Dissertation Defense**

The final examination is the Doctoral Dissertation Defense, where the student presents their completed dissertation to the Advisory Committee. At least nine months must pass between passing the Comprehensive Exam and the Dissertation Defense. The defense will be open to the University community, with details announced to the Graduate School at least 10 days in advance. The student must also notify the Graduate Student Services Coordinator.

At least 10 days before the defense, the student must submit their dissertation to the Advisory Committee. The two-hour examination will focus primarily on the dissertation. If the student fails, the Advisory Committee may allow a second attempt. Upon successful defense, the advisor will complete form GS7-D and file it with the Graduate School.

#### **4.5.4. Exceptions to Exam Policies**

Exceptions to exam policies must be submitted to the Graduate Committee as a petition and will only be granted in extreme circumstances.

#### **4.5.5. Example Doctoral Examination Timeline (Forms)**

Tasks and Suggested Timeline	Year 1			Year 2			Year 3			Year 4		
	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer
Select a major advisor												
Select the advisory committee												
Qualifying exam												
Submit GS2 form												
Complete breadth requirement												
Comprehensive exam												
Submit GS5D form												
Submit Research Approval form												
Dissertation Defense												

#### **4.5.6. Advisor Requirement and Advisory Committee**

All Ph.D. students, after passing the qualifying exams, must always have a research advisor, select an Advisory Committee, and file Form GS2. The Advisory Committee consists of the student's Committee Chair and at least three additional faculty members. It is expected that the research advisor has appropriate experience in the research focus area the student wishes to pursue. Faculty members from outside the IE department are permitted to be members of the Advisory Committee; however, a simple majority of the committee (including the Committee Chair) must be from the IE department.

If a student does not have an advisor for a span of 30 contiguous days after passing the qualifying exam, the student's case is automatically brought to the Graduate Committee.

The Graduate Committee may decide to (a) remove the student from the Ph.D. program, (b) articulate a set of requirements that the student must satisfy by a certain date, or (c) postpone making a decision on the student until a given time. Option (c) requires the Department Chair's approval.

#### ***4.5.7. Procedure for Ph.D. Student Advising under Unforeseen Advisor Circumstances***

The department recognizes that unforeseen circumstances may arise that could impact a research advisor's ability to supervise a Ph.D. student. These circumstances could include, but are not limited to, the advisor leaving their faculty position in the department, serious illness/injury, death, or retirement. These unforeseen circumstances should, in no way, impact the student's ability to continue to receive funding from the department to complete their Ph.D. if they choose to continue to pursue their Ph.D. in Industrial Engineering at Clemson.

In these circumstances, the department will continue to financially support the Ph.D. student through a teaching or research assistant position, as described in the student's signed admission offer letter and contingent upon the conditions outlined in Section 3.14.16 of this handbook. The department will make appropriate accommodations to ensure the student can successfully complete their Ph.D.. Such accommodations could include allowing the student to continue their current research direction under the supervision of a different faculty member within the IE department.

Note that if the Ph.D. advisor is moving to another university and has invited the student to come with them, the student may choose to transfer universities (though it is not required to do so). If the student chooses to transfer, the IE department will help with administrative logistics, e.g., transferring credits, as appropriate. It is highly recommended that the student reaches out to one of the faculty members of the Inclusive Excellence committee for the committee to advocate and assist during the transition and after as needed.

#### **4.6. Research Dissemination Expectations**

The development of high-quality journal publications is a Ph.D. student's primary goal, and all Ph.D. students should expect enthusiastic and professional support from their advisors. The IE department will support students in any way possible toward accomplishing this aim.

As such, IE Ph.D. students are expected to submit multiple articles to refereed journals during their Ph.D. studies, with one or more possibly accepted for publication before the Dissertation Defense is scheduled. In addition, Ph.D. students are expected to present their research at conferences.

#### **4.7. Master of Science En-Route**

Students currently enrolled in the doctoral program who have completed or plan to complete all requirements for the master's degree in Industrial Engineering may be eligible to receive a master's degree en-route to their Ph.D. This option is only available to students without an existing master's degree in Industrial Engineering.

##### ***4.7.1. Requirements for MS En-route***

Students wishing to pursue the MS en-route option during their Ph.D. program must complete the following course requirements:

- At least 30 semester credit hours of coursework in total must be completed.
- At least 18 semester credit hours of coursework must be in IE.
- At least 50% of the total graduate credit hours shown on the GS2 must be selected from 8000-level courses.
- Courses taken outside of IE may be selected as follows:
  - All graduate-level courses in the College of Engineering, Computing and Applied Sciences
  - Graduate-level courses in Mathematics, Statistics, Accounting, Finance, Economics, Management, and Psychology
  - All other classes require approval on a case-by-case basis.
  - No research or independent study credits from other departments are accepted.
- The Ph.D. breadth requirement must be complete:
  - For HF students, this is IE 8030 Engineering Optimization and Applications.
  - For OR students, this is IE 8000 Human Factors Engineering.

#### **4.7.2. Procedures for MS En- Route**

All students must begin the process of applying for an MS degree en-route in the semester prior to anticipated graduation. The student is required to:

1. Notify the Graduate Student Services Coordinator of their intent to pursue the M.S. degree en-route to their Ph.D.
2. Fill out the GS2-14 form and follow the digital workflow instructions in the Instructions section of the form.
3. After GS2-14 approval, apply for graduation through the iRoar portal.

#### **4.8. Procedures and Deadlines**

There are some deadlines internal to the IE Department, as well as University and Graduate School deadlines. University and Graduate School deadlines can be found at:  
<http://www.clemson.edu/graduate/students/deadlines.html>.

The guidance on formatting and submission of theses and dissertations can be found at:  
<http://www.clemson.edu/graduate/students/theses-and-dissertations/index.html>.

### **5. THE MASTER OF SCIENCE DEGREE**

Students may pursue the Master of Science (M.S.) degree in Industrial Engineering by either the non-thesis or thesis options. These options are designed to provide a strong foundation across the breadth of industrial engineering and sufficient flexibility to tailor the degree to individual backgrounds and career objectives.

The non-thesis option is an excellent choice for most students. This option provides a solid background for students seeking industrial employment after graduation as well as those

who wish to pursue the Ph.D. The thesis option is available for students with a strong interest in research who can identify a faculty member willing to serve as their major advisor.

Requirements for both the non-thesis and thesis options are provided below. Additional information on graduate-level course offerings can be found at <https://regssb.bannerxe.clemson.edu/StudentRegistrationSsb/ssb/registration>.

### **5.1. Non-Thesis Option**

This option is recommended for all master's students except those with a special interest in research. The coursework associated with this option provides an excellent background for students seeking industrial employment after graduation as well as those planning to enter a doctoral program. Students may further specialize by taking classes in the Human Factors and Ergonomics concentration, though this is not required. Program requirements are below.

#### **5.1.1. M.S. Non-thesis Program Requirements**

All students pursuing the M.S. degree via the non-thesis option must satisfy these general requirements:

1. All M.S. non-thesis students must complete the following courses:
  - IE 8000 Human Factors Engineering
  - IE 8030 Engineering Optimization and Applications
  - IE 8090 Modeling Systems Under Risk or IE 8080 HF Research Design & Analysis
2. At least 30 semester credit hours of coursework must be completed in total.
3. At least 18 semester credit hours of coursework must be in IE.
4. At least 50% of the total graduate credit hours shown on the GS2 must be selected from 8000-level courses.
5. Courses taken outside of IE may be selected as follows:
  - All graduate-level courses in the College of Engineering, Computing and Applied Sciences
  - Graduate-level courses in Mathematics, Statistics, Accounting, Finance, Economics, Management, and Psychology
  - All other classes require case-by-case approval.
  - No research or independent study credits from other departments are accepted.

#### **Important Notes:**

- Credit hours will not be awarded for both IE 8090 Modeling Systems Under Risk and IE 8080 HF Research Design & Analysis.
- A graduate-level IE course (excluding IE 8900 credits) must be a minimum three-credit course.

- Research credits (IE 8910) or seminar courses will not count towards the non-thesis requirement.
- Students may enroll in a maximum of six credits of IE 6000 or IE 8900, which will count towards the non-thesis requirement.
- Master of Science (MS) students cannot enroll in Master of Engineering (MENG) courses (IE 8500-8590).
- Master of Science (MS) students cannot receive credit for IE 6880, as this course is reserved for non-IE majors.
- MBA Courses that have been approved for Master of Science (MS) students are as follows:
  - MBA 8030 - Statistical Analysis of Business Operations
  - MBA 8060 - Operations Management
  - MBA 8590 - Managerial Decision Modeling
  - MBA 8610 - Information Systems
  - MBA 8620 - Managerial Economics

5.1.1.1. Optional IE Concentrations:

Students may choose to pursue the Human Factors and Ergonomics (HFE) concentration. The following guidelines are provided for students interested in this concentration.

5.1.1.1.1. Human Factors & Ergonomics:

Students who select the Human Factors & Ergonomics (HFE) concentration must complete the following:

Human Factors & Ergonomics	
<b>1. Core</b> 13 credits (required)	<ul style="list-style-type: none"> <li>• IE 8000 Human Factors Engineering</li> <li>• IE 8060 Occupational Biomechanics and Physical Ergonomics</li> <li>• IE 8080 HF Research Design &amp; Analysis</li> <li>• IE 8030 Engineering Optimization and Applications</li> </ul>
<b>2. At least one course (depth)</b> 3 credits (required)	Select one of the following <ul style="list-style-type: none"> <li>• IE 8020 Design and Analysis of Human-Computer Systems</li> <li>• IE 8150 Research Methods in Ergonomics</li> </ul>

The remaining courses to demonstrate breadth (14 credits; with at least 1 course from IE) should be selected by the student. Below is a list of courses related to the HFE concentration:

- IE 6300: Human Factors Engineering in Healthcare
- IE 6510: Investigating Human Error in Complex Systems
- IE 6890: Industrial Ergonomics and Automation
- IE 8010: Design and Analysis of Human-Machine Systems
- IE 6910: HF in Device Design/Analysis
- IE 6910: Cognitive Systems and Resilience Engineering
- IE 8020: Design and Analysis of Human-Computer Systems
- IE 8110: Human Factors in Quality Control
- IE 8120: Work Science and Design
- IE 8160: Research Methods in Collaboration
- PSYC 8100: Research Design & Quantitative Methods I

- PSYC 8110: Research Design & Quantitative Methods II
- PSYC 8130: Research Design & Quantitative Methods III
- PSYC 8220: Human Perception & Performance
- PSYC 8350: Human Factors in Psychology
- PSYC 8620: Organizational Psychology
- PSYC 8730: Structural Equation Modeling
- CPSC 6140: Introduction to Human-Computer Interaction
- CPSC 6110: Virtual Reality Systems
- HCC 8310: Fundamentals of Human-Centered Computing
- HCC 8330: Research Methods for Human-Centered Computing
- HCC 8810: Measurement & Evaluation of HCC Systems

**Important Note:**

- Occasionally, the Department offers new courses listed as IE 6910 or IE 8930. These courses may count towards the HFE concentration. Please contact the Graduate Coordinator for more information.

**5.1.2. Becoming a Non-Thesis Student**

When a student selects the non-thesis option, they should construct a plan of study. Students may complete their degree in as few as three academic semesters (or one calendar year if courses are taken during the summer), but many students opt to spread their coursework across four academic semesters. Please refer to the Graduate School's documentation for a complete discussion about the submission of the GS2 or GS2-14 Plan of Study forms.

**5.2. Thesis Option**

The thesis option requires the successful completion of a thesis in addition to the credit requirements described below. If you wish to pursue this option, you must first find a faculty member whose research interests align with yours and who agrees to be your major advisor.

**5.2.1. M.S. Thesis Program Requirements**

Students pursuing the M.S. degree via the thesis option must satisfy the requirements listed below:

1. All M.S. thesis students must complete the following courses:
  - IE 8000: Human Factors Engineering
  - IE 8030: Engineering Optimization and Applications
  - IE 8090: Modeling Systems Under Risk or IE 8080: HF Research Design & Analysis
2. At least 6 semester credit hours of thesis research (IE 8910) must be taken.
3. At least 24 semester credit hours of coursework (exclusive of any thesis research) must be taken.
4. At least 15 semester credit hours of coursework (exclusive of any thesis research) must be in IE.
5. At least one-half of the total graduate credit hours shown on the GS2 (exclusive of any thesis research) must be selected from 8000-level courses.
6. The student and major advisor shall select specific courses that support the thesis research.

7. M.S. thesis students may elect to be in the Human Factors and Ergonomics (HFE) concentration (see concentration requirements in the section above). If a concentration is selected, then at least 6 semester credit hours of thesis research (IE 8910) must be taken as part of the remaining breadth credit hours.

Important Notes:

- Students must have an approved program advisory committee on file to enroll in thesis research hours (IE 8910).
- Thesis students cannot count IE 8900 credits towards their degree.
- Master of Science (MS) students cannot enroll in Master of Engineering (MENG) courses (IE 8500-8590).

### **5.2.2. Becoming a Thesis Student**

You and your major advisor will select the remaining members of the advisory committee and develop a plan of study. Besides the core subjects, the remaining hours are selected to support the research and to augment your background. Additionally, thesis research represents an original contribution to the selected field of study; therefore, the program of study will also include at least 6 semester credit hours of thesis research.

Once you have decided to pursue the thesis option, identified a major advisor and advisory committee, and defined the plan of study, you must complete Form GS2. An approved GS2 formalizes the requirements for the degree. Please refer to the Graduate School's documentation for a complete discussion about the submission of the GS2 or GS2-14 Plan of Study forms.

After a thesis topic is selected, you must schedule a thesis proposal presentation to your advisory committee. You must provide the committee with a thesis proposal document at least 10 calendar days prior to the presentation. The GS-Research Approval form should be submitted to the Graduate School once the thesis proposal is approved by the advisory committee.

Prior to graduation, you must schedule your thesis defense. You must provide the committee with a final thesis document at least 10 calendar days before the presentation. Upon successfully defending your thesis, your advisor must complete Form GS7-M and file it with the Graduate School.

In addition to notifying the Graduate School, you should also reach out to the Graduate Student Services Coordinator for a template to announce the defense within the department. Populate the template with appropriate information and provide it back to the Graduate Student Services Coordinator to announce the defense to the department.

### **5.3. Internship Track**

The Internship Track is recommended for all master's students interested in gaining practical experience in industry during either a fall or spring semester during graduate studies. This track can be pursued in conjunction with either the Non-Thesis or Thesis Option and/or the HFE concentration. Students seeking summer internship opportunities are not required to choose this degree option.

The coursework associated with this option provides an excellent background for students seeking industrial employment after graduation as well as those who anticipate entering a doctoral program. If a student chooses to enroll in Curricular Practical Training (CPT) during either a fall and/or spring semester, this option must be chosen, and the student must register for INT 8010 or COOP 6010 (the appropriate course depends on the length and scope of the CPT) for zero credits during the corresponding fall/spring semester.

Students in a full-time CPT position (>20 hours per week) are eligible to take up to 1 additional course concurrently with their CPT opportunity in the Fall and Spring semesters. In the summer, students may take up to 2 courses regardless of weekly CPT working hours. When enrolling in the internship track, please inform the graduate program coordinator when requesting them to fill out the IS 130 form. For students pursuing internships during the summer, no course registration is required.

Below is a table with some sample plans for students selecting the internship track.

Option	First Fall Semester	First Spring Semester	Summer	Second Fall Semester	Second Spring Semester
1	3 courses	CPT + 1 online course	CPT + 1 online course	CPT + INT 8010	3 courses
2	3 courses	3 courses	CPT	CPT + INT 8010	4 courses
3	3 courses	3 courses	CPT	3 courses	CPT + 1 traditional or hybrid course
4	3 courses	3 courses	CPT + 2 courses	CPT + 1 course	CPT + 1 traditional or hybrid course

### **5.3.1. *Becoming an internship student***

Typically, students decide in their 3rd or 4th academic semester (fall or spring) to pursue this degree option. Further, students opting for this degree option must be in good academic standing and not on probation (i.e., hold a cumulative GPA  $\geq 3.0$ ). Approved registration in INT 8010 will confirm selection of the internship option. Students not pursuing this option will not be permitted to register for INT 8010. The student's plan of study should also be updated accordingly. Please refer to the Graduate School's documentation for a complete discussion about the submission of the GS2 or GS2-14 Plan of Study forms.

### **5.4. Enrollment in IE 8900 and IE 6000**

Students may be invited to join a faculty member's research team to conduct a limited-scope research project that counts as a maximum of three credit hours in any semester. Individual faculty members extend these invitations to students whom they judge to be qualified. Each student is limited to a maximum of six credits of IE 8900.

Undergraduate students pursuing the BS/MS option and who are members of the Honors College may take up to six credits of IE 6000. IE 6000 is intended to serve as the equivalent of an honors thesis for these students. Since it does not fully meet the requirements of a traditional M.S. thesis, these credits will count only towards the non-thesis requirement.

#### **5.5. Students Enrolled in the BS/MS Option**

Students in the BS/MS option may count up to 12 credits of graduate IE courses towards both their BS and MS degrees. Since the 6000-level version of a required 4000-level class is not eligible, students often take advantage of this option by enrolling in the 6000-level version of an IE technical elective. This course can count towards both their BS degree and their MS degree in IE at Clemson. There are three important requirements associated with this program:

1. The student must have completed the bachelor's curriculum through the junior year (minimum 90 credits) and have a minimum overall GPA of 3.4 to be eligible.
2. All other requirements outlined in Section 5.1.1 still apply.
3. The combined bachelor's/master's degree (documented on GS6-Bachelor-to-Graduate) must include a minimum of 150 total credit hours. This total may contain a maximum of six credit hours of thesis research, and all post-baccalaureate course credits included must be at the 6000 level or higher.

Students in the BS/MS option automatically become master's students upon completion of their BSIE degree.

#### **5.6. Changing Degree Program to the Ph.D. Program**

If, at any time during their master's study, a student wishes to pursue a Ph.D. degree in the IE department, the following procedure must be followed:

1. The student must submit a complete application package at Clemson Graduate Admissions (see Section 2.1 for additional details).  
<https://www.clemson.edu/graduate/admissions/index.html>
2. The Graduate Committee may vote to waive the application fee for the student.
3. The Graduate Committee will vote on whether to admit the student to the Ph.D. program, with admission effective the next long semester after the semester in which the application is submitted.
4. The Graduate Coordinator will notify the student of the admission decision. If successful, the Graduate Coordinator will complete the GS14 form to convert the student from MS to Ph.D. classification at the beginning of the next semester.
5. If the student enters the Ph.D. program in a spring semester, they may choose to take the qualifying exam at the end of the same semester in May, although this is not required.

#### **5.7. Procedures and Deadlines**

There are internal deadlines within the IE Department, as well as University and Graduate School deadlines. University and Graduate School deadlines are available at: Graduate Deadlines (<http://www.clemson.edu/graduate/students/deadlines.html>).

Students are responsible for knowing and adhering to Graduate School deadlines, as missing these deadlines may delay graduation. Guidance on thesis and dissertation formatting and submission processes can be found at: Thesis and Dissertation Guide (<http://www.clemson.edu/graduate/students/theses-and-dissertations/index.html>).

## **6. THE MASTER OF ENGINEERING DEGREE**

The Master of Engineering (MEng Online) degree is a terminal master's degree developed exclusively for working professionals seeking advanced education while remaining full-time employees. The MEng is a coursework-only degree delivered exclusively online. The program consists of 10 courses that students take in lockstep fashion over a 30-month period: one course at a time, three courses per year. New cohorts begin in May of each year, and no other entry is allowed.

### **6.1. MEng Online Courses**

The program consists of 10 classes:

1. IE 8500 Foundations of Supply Chain and Logistics
2. IE 8510 Descriptive Analytics
3. IE 8520 Prescriptive Analytics
4. IE 8530 Foundations of Quality
5. IE 8540 Supply Chain and Logistics Modeling I
6. IE 8550 Supply Chain and Logistics Modeling II
7. MGT 8560 Business Fundamentals for Supply Chain Management
8. IE 8570 Health, Safety, and the Environment
9. IE 8580 Case Studies in Supply Chain and Logistics
10. IE 8590 Capstone Design Project

Students in the MEng Online program cannot enroll in courses associated with the M.S./Ph.D. program.

### **6.2. Process and Procedures**

#### ***6.2.1. Schedule of Courses***

Classes will be offered in the following sequence, with “May” representing the semester between May and August, “August” representing the semester between August and December, and “January” representing the semester between January and May.

#### ***6.2.2. Appeals Process***

Appeals for waivers to any of these policies and procedures are made to the MEng Program Coordinator. Students should outline the nature of their appeal and the desired outcome in writing and submit the document to the MEng Program Coordinator. A meeting of the MEng Committee will be held, and the decision will be communicated to the student in writing.

### **6.3. Applying to the MEng Online Program**

Directions on how to apply can be found at  
[https://www.clemson.edu/cecas/departments/ie/academics/meng/cost\\_admissions.html](https://www.clemson.edu/cecas/departments/ie/academics/meng/cost_admissions.html).

### **6.3.1. Admission Requirements**

Minimum requirements to be considered for admission to the MEng Online program are:

1. An undergraduate degree from a 4-year university.
2. Three years of creditable experience after the undergraduate degree has been obtained.
3. A letter of recommendation from a supervisor indicating you are highly motivated, organized, and a top candidate for this program.
4. Either calculus courses taught for engineering or a business calculus course plus a statistics course. Topics that should be covered in these classes can be found on the Master of Engineering website.

### **6.3.2. Transfer Credits**

The MEng has some unique features and is also a degree that is taught in lockstep fashion, so each course utilizes information taught in all previous courses. As such, students are not permitted to transfer courses from other universities.