

# **GRADUATE STUDENT HANDBOOK**

**G.W.W. School of Mechanical Engineering  
Georgia Institute of Technology**

**Last updated June 2019**

## Table of Contents

<b>1</b>	<b>GENERAL INFORMATION.....</b>	<b>7</b>
1.1	ACADEMIC STAFF .....	7
1.1.1	Leadership/Faculty .....	7
1.1.2	Academic Advisors and Administration .....	8
1.2	WOODRUFF SCHOOL GRADUATE COMMITTEE.....	9
1.3	WOODRUFF SCHOOL GRADUATE STUDENT DEVELOPMENT COMMITTEE .....	9
1.4	BUZZPORT .....	10
1.5	CATALOG .....	10
1.6	OSCAR.....	10
1.7	CALENDAR OF EVENTS .....	10
1.8	HOUSING.....	11
1.9	ME NEWS .....	11
1.10	OFFICE OF INTERNATIONAL EDUCATION .....	11
1.11	PARKING.....	11
1.12	REGISTRAR .....	11
1.13	RESEARCH GUIDES.....	11
1.14	STUDENT LIFE AND SERVICES .....	11
1.14.1	Mental Health and Stress Management.....	11
1.14.2	Mediation and Conflict Resolution.....	12
1.14.3	Graduate Student Ombuds Services.....	13
1.14.4	EthicsPoint .....	13
1.14.5	Title IX Compliance.....	13
1.14.6	Mechanical Engineering Graduate Association (MEGA).....	14
1.14.7	Woodruff School Graduate Women (WSGW) .....	14
1.15	DISMISSAL POLICY .....	14
1.15.1	Academically Dismissed .....	14
1.15.2	FAQ: Readmission .....	15
1.16	HONOR CODE .....	15
1.17	ADMISSIONS.....	15
1.17.1	FAQ: Admissions.....	15
1.18	PROGRAM OPTIONS.....	16
1.18.1	BS/MS Program.....	16
1.18.2	Dual Degree MBA Program.....	16
1.18.3	Dual Master's Degree Opportunities at Georgia Tech Lorraine .....	16
1.18.4	Joint Master's Degree with Universität Stuttgart .....	16
1.18.5	Learn from a Distance .....	16
1.19	APPLY FOR A GRA OR GTA .....	16
1.20	RESEARCH IN THE WOODRUFF SCHOOL.....	18
1.21	COURSES .....	18
1.22	FINANCIAL AID.....	22
1.22.1	Graduate Research Assistantships (GRA) and Graduate Teaching Assistantships (GTA).....	22
1.22.2	Financial Support Actions.....	22
1.22.2	Graduate Conference Funds for Travel: .....	23
1.22.3	Other Financial Aid Sources .....	23
1.22.4	Graduate Cooperative Program.....	23
1.22.5	Woodruff School Doctoral Teaching Intern Program.....	24
1.22.6	Outside Employment.....	24
1.22.7	FAQ: Coop/Internships .....	25
1.23	FELLOWSHIPS .....	25
1.23.1	Writing and Presentation Assistance .....	25

<b>2</b>	<b>MASTER'S DEGREE .....</b>	<b>26</b>
2.1	DEGREE REQUIREMENTS .....	26
2.1.1	<i>M.S. in Mechanical Engineering (M.S.M.E.).....</i>	26
2.1.2	<i>M.S. in Nuclear Engineering (M.S.N.E.).....</i>	27
2.1.3	<i>M.S. in Bioengineering (M.S.BIOE.).....</i>	28
2.1.4	<i>M.S. in Medical Physics (M.S.M.P.).....</i>	29
2.1.5	<i>M.S. in Paper Science and Engineering (M.S.P.S.).....</i>	32
2.1.6	<i>Master of Science (M.S., an undesignated degree) .....</i>	35
2.1.7	<i>Joint M.S. in Mechanical Engineering (M.S.M.E) with Universität Stuttgart .....</i>	37
2.2	PROGRAM OF STUDY.....	37
2.2.1	<i>FAQ: Program of Study .....</i>	37
2.3	GUIDELINES FOR REGISTRATION .....	38
2.3.1	<i>Courses .....</i>	38
2.3.2	<i>Registration .....</i>	38
2.3.3	<i>Enrollment Reduction or Enrollment Waiver .....</i>	39
2.4	GRADES AND CREDIT HOURS .....	39
2.5	SPECIAL PROBLEM COURSES .....	40
2.6	TRANSFER CREDITS .....	40
2.7	PETITION TO THE FACULTY.....	41
2.8	APPLY TO GRADUATE .....	41
2.9	ORIENTATION VIDEO FOR DISTANCE LEARNING STUDENTS.....	43
2.10	CHECKLIST FOR THE MASTER'S DEGREE.....	44
2.10.1	<i>Thesis MSME Degree.....</i>	45
2.10.2	<i>Coursework MSME Degree .....</i>	51
2.11	HOW TO FIND/CHANGE A FACULTY ADVISOR.....	54
2.11.1	<i>How to Find a Faculty Advisor.....</i>	54
2.11.2	<i>Changing Your Faculty Advisor .....</i>	54
2.12	WRITING YOUR MASTER'S THESIS .....	55
2.12.1	<i>Suggested Content of the Thesis.....</i>	55
2.13	THE M.S. THESIS PROCESS AND PRESENTATION .....	56
2.13.1	<i>M.S. Thesis Process .....</i>	56
2.13.2	<i>M.S. Thesis Presentation.....</i>	58
2.14	SUBMITTING YOUR THESIS .....	59
2.14.1	<i>Format Check .....</i>	59
2.14.2	<i>Electronic Submission of Theses and Dissertations.....</i>	59
2.15	DEADLINES.....	60
<b>3.</b>	<b>PH.D. DEGREE .....</b>	<b>61</b>
3.1	COURSE REQUIREMENTS.....	61
3.1.1	<i>Mechanical Engineering .....</i>	61
3.1.2	<i>Nuclear Engineering.....</i>	61
3.1.3	<i>Nuclear Engineering with Nuclear Enterprise Management specialization.....</i>	62
3.1.4	<i>Medical Physics Option in Nuclear Engineering.....</i>	62
3.1.5	<i>Robotics .....</i>	63
3.1.6	<i>Paper Science and Engineering.....</i>	63
3.1.7	<i>Bioengineering.....</i>	64
3.2	GUIDELINES FOR REGISTRATION .....	64
3.2.1	<i>Courses .....</i>	64
3.2.2	<i>Registration .....</i>	65
3.2.3	<i>Enrollment Reduction or Enrollment Waiver .....</i>	65
3.3	GRADES AND CREDIT HOURS .....	66
3.4	SPECIAL PROBLEM COURSES .....	67

3.5	PETITION TO THE FACULTY .....	67
3.6	APPLY TO GRADUATE .....	67
3.7	CHECKLIST FOR THE PH.D. DEGREE .....	70
3.8	HOW TO FIND/CHANGE A FACULTY ADVISOR .....	78
3.8.1	<i>How to Find a Faculty Advisor</i> .....	78
3.8.2	<i>Changing your Faculty Advisor</i> .....	78
3.9	DEVELOP A PROGRAM OF STUDY .....	78
3.9.1	<i>Transfer Credits</i> .....	79
3.9.2	<i>FAQ: Program of Study</i> .....	79
3.10	THE PH.D. QUALIFYING EXAMINATION .....	80
3.10.1	<i>Objective</i> .....	80
3.10.2	<i>Mechanical Engineering Qualifying Examination</i> .....	80
3.10.3	<i>Nuclear and Radiological Engineering Qualifying Examination</i> .....	81
3.10.4	<i>Medical Physics Qualifying Examination</i> .....	82
3.10.5	<i>Bioengineering Qualifying Examination</i> .....	82
3.10.6	<i>Grade Point Average Requirement</i> .....	86
3.10.7	<i>Examination Schedule</i> .....	86
3.10.8	<i>Preparation Guidelines</i> .....	87
3.10.9	<i>Grading and Notification of Examination Results</i> .....	87
3.11	TEACHING PRACTICUM .....	88
3.12	SEMINARS .....	89
3.13	PH.D. PROPOSAL .....	90
3.13.1	<i>Writing the Ph.D. Proposal</i> .....	90
3.13.2	<i>Ph.D. Proposal Process and Presentation</i> .....	92
3.14	PH.D. DISSERTATION .....	94
3.14.1	<i>Ph.D. Residency Requirement</i> .....	94
3.14.2	<i>Guidelines for Ph.D. Dissertation</i> .....	95
3.14.3	<i>Ph.D. Dissertation Defense Process</i> .....	96
3.14.4	<i>Submitting Your Dissertation</i> .....	97
3.14.5	<i>Publication of Dissertation</i> .....	98
3.14.6	<i>Deadlines</i> .....	98
<b>4.</b>	<b>REGISTRATION .....</b>	<b>99</b>
4.1	BASIC REGISTRATION INFORMATION .....	99
4.1.1	<i>Holds</i> .....	99
4.1.2	<i>Registration Errors</i> .....	99
4.1.3	<i>How to Register for Classes</i> .....	100
4.1.4	<i>Time Tickets</i> .....	100
4.1.5	<i>Registration Summary</i> .....	100
4.1.6	<i>Variable Hour Courses</i> .....	100
4.1.7	<i>Request a Permit for Seminars or the Teaching Practicum</i> .....	101
4.1.8	<i>Special Problems Courses</i> .....	101
4.1.9	<i>Schedule of Classes</i> .....	102
4.2	OVERRIDES, OVERLOADS & WAITLISTS .....	102
4.2.1	<i>What are Overrides? (Restricted Class Permits, Overloads, Pre-Requisite)</i> .....	102
4.2.2	<i>Request an Override</i> .....	102
4.2.3	<i>Viewing the Status of Override Requests</i> .....	103
4.2.4	<i>Taking 4000 Level Courses</i> .....	103
4.2.5	<i>Waitlists</i> .....	104
4.3	RESTRICTIONS ON CLASSES & CAMPUS CODES .....	104
4.3.1	<i>Campus Restrictions: Is this class is offered in Atlanta?</i> .....	104
4.3.2	<i>Viewing Notes on Classes in the Registration Systems</i> .....	105
4.3.3	<i>FAQ: Registration</i> .....	105

<b>5</b>	<b>OTHER SERVICES .....</b>	<b>107</b>
5.1	ACCIDENTS AND INJURIES .....	107
5.2	OFFICE SPACE .....	107
5.3	COMPUTERS AND NETWORKING .....	108
5.3.1	Office of Information Technology .....	108
5.3.2	High-Performance Computers .....	108
5.3.3	Woodruff School Help Desk .....	108
5.3.4	Computer Labs .....	109
5.3.5	MRDC Open Lab .....	109
5.3.6	Printing .....	109
5.3.7	Wireless/Walkup Network (LAWN) .....	110
5.4	COPIERS & FAXES .....	110
5.5	ACADEMIC FORMS & SUBMIT PUBLICATIONS/AWARDS .....	110
5.6	SHOPS, LABORATORY, AND EQUIPMENT PURCHASES .....	110
5.7	MONTGOMERY MACHINING MALL .....	110
5.8	THE INVENTION STUDIO .....	111
5.9	ELECTRONICS LAB .....	111
<b>6</b>	<b>APPENDICES.....</b>	<b>112</b>
APPENDIX A	FREQUENCY OF GRADUATE COURSE OFFERINGS BY COURSE NUMBER .....	112
APPENDIX B	GRADUATE COURSE OFFERINGS BY RESEARCH GROUP AND SEMESTER.....	117
APPENDIX C	ME, MP, AND HP VIDEO AND ONLINE COURSE OFFERINGS.....	119
APPENDIX D	TEST SPECIFICATIONS FOR ME PH.D. QUALIFYING AREA EXAMS .....	122
D.1	Exam Area Undergraduate Courses.....	122
D.2	Applied Mathematics (AMath) .....	122
D.3	Design (DE) .....	123
D.4	Dynamics & Vibrations (DV).....	124
D.5	Fluid Mechanics (FL) .....	125
D.6	Heat Transfer (HT) .....	126
D.7	Manufacturing (MFG).....	127
D.8	Mechanics of Materials (MM) .....	128
D.9	System Dynamics and Control (SDC).....	129
D.10	Thermodynamics (TH).....	130
D.12	Bioengineering (BE) .....	132
D.13	Special Examination Areas.....	133
D.14	Acoustics (AC) .....	133
D.15	Computer-Aided Engineering (CAE) .....	134
D.16	Tribology (TR).....	135
APPENDIX E	FORMS.....	137
	Change of Advisor Form (LOGIN) .....	137
	Outside Employment Request for GWW Graduate Students .....	137
	Doctoral Teaching Intern Application .....	137
	Special Problems Form (LOGIN) .....	137
	Certificate of Completion of PSE Coursework.....	137
	Proposed MSME Program of Study (LOGIN) .....	137
	Proposed MS Undesignated Program of Study .....	137
	Proposed NE Master's Program of Study (LOGIN).....	137
	Proposed MP Master's Program of Study (LOGIN).....	137
	Proposed Bioengineering Master's Program of Study .....	137
	Proposed PSE Master's Program of Study.....	137
	Request for Approval of Master's Thesis Topic .....	137
	Certificate of Thesis Approval for Master's Students .....	137

<i>Graduate Petition for Degree</i> .....	137
<i>Equipment Checkout Clearance</i> .....	138
<i>Enrollment Waiver</i> .....	138
<i>Thesis/Proposal/Dissertation Assessment</i> .....	138
<i>Seminar Registration Form (LOGIN)</i> .....	138
<i>Teaching Practicum Request (LOGIN)</i> .....	138
<i>Mechanical Engineering Proposed Ph.D. Program of Study (LOGIN)</i> .....	138
<i>Nuclear Engineering Proposed Ph.D. Program of Study (LOGIN)</i> .....	138
<i>Medical Physics Proposed Ph.D. Program of Study (LOGIN)</i> .....	138
<i>Paper Science and Engineering Proposed Ph.D. Program of Study</i> .....	138
<i>Bioengineering Proposed Ph.D. Program of Study</i> .....	138
<i>Robotics Proposed Ph.D. Program of Study</i> .....	138
<i>Request for Admission to Ph.D. Candidacy</i> .....	138
<i>Faculty Consent Form</i> .....	138
<i>Certificate of Approval for Doctoral Students</i> .....	138
<i>Graduate Student Room/Key/Equipment Request (LOGIN)</i> .....	139
<i>Montgomery Machining Mall Student Work Request</i> .....	139
APPENDIX F    SAMPLE MSME PROGRAM OF STUDY TEMPLATES .....	140
F.1 <i>Acoustics</i> .....	140
F.2 <i>Automation, Robotics and Control</i> .....	141
F.3 <i>Bioengineering</i> .....	141
F.4 <i>Computer Aided Engineering</i> .....	142
F.5 <i>Design</i> .....	142
F.6 <i>Dynamics and Vibration</i> .....	143
F.7 <i>Fluid Mechanics</i> .....	144
F.8 <i>Heat Transfer, Combustion, and Energy Systems</i> .....	144
F.9 <i>Manufacturing</i> .....	145
F.10 <i>Mechanics of Materials</i> .....	146
F.11 <i>Micro and Nano Engineering</i> .....	146

# 1 General Information

## 1.1 Academic Staff

### 1.1.1 Leadership/Faculty



**Dr. Andrei Fedorov**

Associate Chair for Graduate Studies  
Love Building, Room 303, (404) 385-1356  
AGF@gatech.edu

- Oversight of the graduate program in the Woodruff School
- Career counseling and advice
- *Ex officio* member of the School's Graduate Committee
- Liaison for the graduate program with other academic units on the Georgia Tech campus



**Dr. Steven Biegalski**

Nuclear and Radiological Engineering and Medical Physics Program Chair  
Boggs Building, Room 3-39S, (404) 894-3718  
steven.biegalski@me.gatech.edu

- Administers the Nuclear and Radiological Engineering/Medical Physics Programs



**Dr. Bert Bras**

Associate Chair for Administration  
MRDC Building, Room 3218, (404) 894-9667  
bert.bras@me.gatech.edu

- Responsible for the scheduling of classes and registration



**Dr. Wayne Whiteman**

Director of the Office of Student Services  
MRDC Building, Room 3102, (404) 894-3204  
wayne.whiteman@me.gatech.edu

- Manages the Office of Student Services
- Assists the Associate Chairs of the Woodruff School
- Assists in the advisement of both undergraduate and graduate students



**Dr. Jeffrey Donnell**

Senior Academic Professional  
MRDC Building, Room 3105, (404) 894-8568  
jeff.donnell@me.gatech.edu

- Assists with NSF, DoD, and similar fellowships

**1.1.2 Academic Advisors and Administration**

The Woodruff School's Office of Student Services is located in the MRDC Building, Room 3112.

Office Hours: Monday – Friday, 8:00 a.m. – noon to 1:00 p.m. – 4:30 p.m.



**Ms. Glenda Johnson**

Academic Advisor II  
MRDC Building, Room 3112, (404) 385-0586  
glenda.johnson@me.gatech.edu

- Assists graduate students with programs of study, degree petitions, graduate committee actions, and support forms.
- Advises graduate students with last names beginning with M - Z.





**Ms. Camellia Henry**

Academic Advisor I

MRDC Building, Room 3112, (404) 894-3204

camellia.henry@me.gatech.edu

- Assists graduate students with programs of study, degree petitions, graduate committee actions, and support forms.
- Advises graduate students with last names beginning with A-L.



**Ms. Katherine Drake**

Academic Assistant II

MRDC Building, Room 3112, (404) 894-3204

katherine.drake@me.gatech.edu

- Assists graduate students with the admissions process
- Assists with NRE and MP graduate actions

**TBD**

Academic Assistant II

MRDC 3112, (404) 385-5671

btenney6@gatech.edu

- Point of contact for all visitors to the Office of Student Services
- Assists with graduate admissions
- Schedules appointments and meetings

## **1.2 Woodruff School Graduate Committee**

The Woodruff School Graduate Committee is the academic faculty committee that oversees the operation of the Woodruff School's graduate programs. The committee has responsibility for all graduate-level degree requirements, approval of new courses, and approval of thesis reading committees. The committee typically meets once a month.

## **1.3 Woodruff School Graduate Student Development Committee**

The Graduate Student Development Committee (GSDC) is responsible for fostering the recruitment and development of the graduate students of the Woodruff School.

#### Charges and Responsibilities

- Recruit top tier students to the Woodruff School graduate programs
- Support the planning and execution the graduate student recruiting visit days
- Work to continually improve the experience, resources, training, and services we offer to Woodruff School graduate students
- Promote and facilitate interaction between the Woodruff School graduate students and faculty

#### Composition

The committee includes faculty members across all ranks and levels of experience at Georgia Tech to the extent possible, and be representative of the GWW School's Research Area Groups. The committee's chair and membership are determined by the GWW School's Faculty Advisory Committee in conjunction with the School Chair. The committee includes the Associate Chair for Graduate Studies (ex-officio), the Director of the Office of Student Services (ex-officio), and the staff (graduate advisors) of the Office of Student Services (ex-officio). The committee also includes one representative from each of the following graduate student groups: Woodruff School Graduate Women (WSGW), Mechanical Engineering Graduate Association (MEGA), Latino Organization of Graduate Students (LOGRAS), and the Black Graduate Student Association (BGSA). Each student representative shall serve one academic year. These graduate student representatives are present to provide a direct line of communication from the student body to the faculty and school leadership.

### **1.4 BuzzPort**

A secure site (portal) that provides students, faculty, and staff with campus information and resources. <https://buzzport.gatech.edu>

### **1.5 Catalog**

The general rules and regulations that govern all graduate students at Georgia Tech are found in the *General Catalog*. [www.catalog.gatech.edu](http://www.catalog.gatech.edu)

### **1.6 OSCAR**

For the listing of all classes to be offered each semester and complete registration information, see the On-Line Student Computer Assisted Registration (OSCAR). OSCAR also has instructions, class schedules, and academic calendar information. [oscar.gatech.edu](http://oscar.gatech.edu)

### **1.7 Calendar of Events**

<http://www.me.gatech.edu/aggregator/sources/1>

## **1.8 Housing**

[www.housing.gatech.edu](http://www.housing.gatech.edu)

## **1.9 ME News**

<http://www.me.gatech.edu/news>

## **1.10 Office of International Education**

<https://www.oie.gatech.edu/>

## **1.11 Parking**

[www.parking.gatech.edu](http://www.parking.gatech.edu)

## **1.12 Registrar**

[www.registrar.gatech.edu](http://www.registrar.gatech.edu)

## **1.13 Research Guides**

<http://libguides.gatech.edu/mechanical>

<http://libguides.gatech.edu/grads>

## **1.14 Student Life and Services**

<http://catalog.gatech.edu/student-services/>

### **1.14.1 Mental Health and Stress Management**

Graduate school can be stressful. It is important to maintain your mental health and well-being during your time and the Woodruff School and beyond. If you are experiencing mental health concerns, there are a number of resources available on campus to support you, including:

#### The Office of the Dean of Students

The Office of the Vice President for Student Life and Dean of Students promotes development and involvement, and also provides advocacy, information, resources and referrals to help resolve concerns and address emergencies. The Office maintains a 24/7 emergency on-call system to respond to student emergencies – including medical and personal. The Office of the Vice President for Student Life and Dean of Students provides a number of services to assist students with medical and personal emergencies. To access these services during regular business hours, students and/or their families may notify the office at (404) 894-6367. In the event of an after-hours emergency, individuals should contact the Georgia Tech Police Department at (404) 894-2500 and request that the “Dean on Call” be contacted. There is an emergency

“Dean on Call” at all times to assist students in need. For more information, please visit:

<http://grandchallenges.gatech.edu/office-dean-students>

#### The Counseling Center

The Counseling Center educates students for life by providing a variety of services and programs that are consistent and consonant with the strategic plan goals of the Institution and the Division of Student Life. Services include short-term individual counseling, group counseling, couples counseling, testing and assessment, crisis intervention, referral services, as well as outreach programming, and consultation for faculty and staff, family and friends of Georgia Tech students. Through our range of services, the Georgia Tech Counseling Center contributes to overall student success and the Institute’s core vision to “define the technological research university of the 21st century and educate the leaders of a technologically driven world.”

All counseling services are confidential and free of charge for eligible students. The Counseling Center provides brief or short-term therapy for a variety of presenting issues. Concerns that require on-going or long-term treatment are best served through referral to one of the many qualified community providers we have in the nearby Atlanta community. Our primary goal is to provide students with the services, support, and skills needed to grow, develop, learn, and thrive while at Georgia Tech. Please do not hesitate to contact the Counseling Center if you have any questions, at (404) 894-2575 or by visiting:

<http://www.counseling.gatech.edu/>

#### 1.14.2 Mediation and Conflict Resolution

The Office of Student Services is available help you. If you are a PhD or MS thesis student, this particularly includes if you ever find you are struggling to effectively communicate with your advisor or are experiencing a conflict that you cannot resolve on your own. The Office of Student Services staff, including Dr. Wayne Whiteman, Glenda Johnson and Camellia Henry, and Dr. Andrei Fedorov, the Associate Chair for Graduate Studies, are available to hear your concerns and advise you on how to find solutions. We can help you determine the best methods to communicate directly with your advisor and/or hold mediated conversations between you and your advisor.

We encourage you to reach out to us as soon as you are experiencing a problem so that we may help you reestablish an effective working relationship before the problem escalates. You can trust that we will

respect requests for confidentiality, except on issues we are required by law to report, related to sexual harassment and violence.

#### 1.14.3 Graduate Student Ombuds Services

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

<http://www.provost.gatech.edu/reporting-units/conflict-resolution-ombuds/contact>

#### 1.14.4 EthicsPoint

Georgia Tech has partnered with EthicsPoint, Inc. to provide a means for members of the Georgia Tech community to report issues of concern. This internet-based reporting system allows anonymous communications and feedback. This helps ensure that the Institute can respond to concerns in the most efficient and effective manner. For more information about EthicsPoint or to make a report, please visit:

<https://secure.ethicspoint.com/domain/media/en/gui/7508/index.html>

#### 1.14.5 Title IX Compliance

At Georgia Tech, we want everyone to achieve their potential and this means sustaining an environment where there is equal opportunity for excellence. Title IX is a federal law designed to ensure women and men are provided equal access to programs and activities at educational institutions that receive federal financial assistance. Our policies and practices are anchored in this law, which fosters a culture of inclusivity on campus and provides everyone with a competitive and successful academic or employment experience. Learn more about Title IX at the Refrain, Reject, Report website.

Every member of the Tech community -- students, faculty, staff, and administrators -- is expected to comply with Title IX and to practice respectful, ethical, and equitable treatment of others regardless of their sex. Understanding Title IX and the rights it protects is critical to preventing any discriminatory behavior in violation of the federal law. Examples of areas covered under Title IX include, but are not limited to:

- Academics
- Admissions
- Athletics

- Benefits
- Employment/compensation
- Housing
- Pregnancy/childcare
- Recruitment
- Sexual harassment

For more information about Title IX or to make a report, please visit:  
<https://ohr.gatech.edu/resources/employee-relations/title-IX> or  
<http://refrainrejectreport.gatech.edu/>

#### 1.14.6 Mechanical Engineering Graduate Association (MEGA)

MEGA is the only group devoted uniquely to ME students at the Masters and PhD level, and is freely open to all ME graduate students regardless of research interest. MEGA organizes various professional, social, and service-based events to promote a sense of community among ME grad students. For more information about WSGW or to get involved, please visit: <http://pwp.gatech.edu/mega/>

#### 1.14.7 Woodruff School Graduate Women (WSGW)

WSGW is a student group focused on the support and growth of female graduate students in Mechanical Engineering at Georgia Tech. Activities include discussions with women in industry and academia, social gatherings to connect women within Mechanical Engineering, and outreach to prospective students. For more information about WSGW or to get involved, please visit: <http://www.wsgw.gatech.edu/>

### 1.15 Dismissal Policy

<http://me.gatech.edu/files/grad/DismissalPolicy>

#### 1.15.1 Academically Dismissed

1. **Q.** I have been academically dropped from Georgia Tech. What I need to do to be reinstated?

**A.** *Readmission is not guaranteed. If Georgia Tech has dropped you from school, you must do the following:*

- *Sit out of school for at least one semester before you can apply for readmission.*
- *Meet with your Academic Advisor. You will be asked to complete an Academic Contract, Petition to the Faculty form, Readmission form, and a detailed explanation of what happened and what your plan is for returning to school.*

- The paperwork will be reviewed by the Associate Chair of Graduate Studies and then forwarded to the Registrar for processing. **A STUDENT WHO HAS BEEN ACADEMICALLY DISMISSED A SECOND TIME FOR UNSATISFACTORY GRADES WILL NOT BE READMITTED.** See Rules and Regulations <http://www.catalog.gatech.edu/rules/8b.php>

**PLEASE NOTE:** Individual academic departments may have more restrictive rules. Be sure to contact your Academic Advisor.

#### 1.15.2 FAQ: Readmission

1. **Q.** I have not been enrolled for several semesters. What is the procedure for readmission?  
**A.** If you have been out of school for 2 or more consecutive terms, you must apply for readmission. This is an online process. There is a fee associated with this process. For more information regarding deadlines please go to <http://www.registrar.gatech.edu/students/readmission.php#dismissed>

### 1.16 Honor Code

<http://www.catalog.gatech.edu/policies/honor-code/>

### 1.17 Admissions

Apply to a Georgia Tech Graduate Program:

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

Preparing Successful Applications:

<http://www.me.gatech.edu/files/grad/SucGradApplica.ppt>

#### 1.17.1 FAQ: Admissions

1. **Q.** I do not have an engineering degree. Can I apply?  
**A.** To be eligible for an MSME degree, the applicant must have an undergraduate degree in Mechanical Engineering or an equivalent engineering degree.
2. **Q.** I was denied admission. Is there a way I can be reconsidered for admission?  
**A.** The application is good for one year. However, you must notify the Office of Student Services in writing to reactivate your application.

3. **Q.** I was admitted with no financial support. How do I go about finding support?  
**A.** *It is the responsibility of the student to contact faculty members that work in their research area regarding possible support. Please also see the finance section of the graduate handbook for a complete overview of financial support.*
4. **Q.** I was admitted in the program. However, is it possible to defer my acceptance?  
**A.** *The acceptance can be deferred for up to one year.*
5. **Q.** How are students funded?  
**A.** *Graduate Research and Teaching Assistantships and most fellowships are awarded on the basis of academic potential. Students are nominated for assistantships by the department. In general, MS non-thesis students are not funded. Students can apply for a variety of fellowships sponsored by national organizations, corporations, and foundations. Information regarding fellowships is available at [fellowships.gatech.edu](http://fellowships.gatech.edu).*

## **1.18 Program Options**

- 1.18.1 BS/MS Program  
<http://www.me.gatech.edu/undergraduate/bsms>
- 1.18.2 Dual Degree MBA Program  
<https://www.scheller.gatech.edu/degree-programs/mba/dual-degree/index.html>
- 1.18.3 Dual Master's Degree Opportunities at Georgia Tech Lorraine  
<http://www.me.gatech.edu/graduate/GTL>
- 1.18.4 Joint Master's Degree with Universität Stuttgart  
[http://me.gatech.edu/files/grad/ME\\_jointGradProgram](http://me.gatech.edu/files/grad/ME_jointGradProgram)
- 1.18.5 Learn from a Distance  
<https://pe.gatech.edu/degrees/mechanical-engineering>

## **1.19 Apply for a GRA or GTA**

Graduate Research Assistantships (GRA) and Graduate Teaching Assistantships (GTA)

Assistantships are forms of employment and involve a responsibility to perform to the satisfaction of the supervisor. A one-third time assistantship requires an



average of fourteen hours per week be devoted to the assigned activities during the semester, including finals week. Successful and timely completion of an M.S. thesis or a Ph.D. dissertation generally requires that you spend significantly more than fourteen hours per week on thesis research.

Many students are offered some form of financial aid upon admission to the graduate program. This aid is promised for a specific period of time, usually for a one-year period. Summer support is not guaranteed in advance, but our experience has been that those promised support and who wish to stay for the summer semester generally will be supported. However, do not assume that summer support is automatic.

While studying at the Woodruff School, we expect you to be supported by externally-supported graduate research assistantships or fellowships. The Woodruff School does not use GTA assignments for long-term support. Rather, GTA assignments are intended as a safety-net for Ph.D. students needing short-term support. The following priorities are used for assigning GTA support:

- Ph.D. students who have passed the qualifying exam and presented their Ph.D. proposal;
- Ph.D. students who have passed the qualifying exam;
- Ph.D. students; and
- M.S. thesis students.

Nonthesis master's students generally are not given GTA support. In general, a graduate student will not be supported as a GTA if they have been in the Ph.D. program more than three years beyond the award of their M.S. degree, or more than five years beyond the award of their B.S. degree, not counting any periods of full-time, external employment.

Students are assigned as GTA's for a period normally less than one year. In the case of the lead GTA in a course or for critical lab GTA positions, students may be assigned for a period not to exceed two years. This additional time is provided for continuity and overlap with a suitable successor, and for training incoming GTAs. Faculty members teaching a course also provide training. As a general practice, GTA's do not serve as primary instructors. In addition, the Director of Instructional Laboratories works closely with GTA's to assess, develop, maintain, and operate the laboratory courses in which they are assigned.

If you are a new student and want GRA support, you should visit faculty members in your area of interest to ascertain if such support is available. Don't be shy about making faculty members aware of your special qualifications. Also, the Georgia Tech Research Institute (GTRI) employs several Woodruff School graduate students as graduate research assistants. New positions become available throughout the year as new research contracts are awarded. Contact Mr. Todd Phillips at 404.894.3020 about these opportunities.

Visit <http://www.finaid.gatech.edu> for more information.

## 1.20 Research in the Woodruff School

<http://www.me.gatech.edu/research>

These web pages will introduce you to the research activities in the Woodruff School of Mechanical Engineering. Research programs are defined by people. We have excellent academic and research faculty as well as outstanding graduate and undergraduate students and support staff.

- Acoustics / Dynamics: <http://www.me.gatech.edu/research/acoustics>
- Automation, Robotics and Control: <http://www.me.gatech.edu/research/automation>
- Bioengineering: <http://www.me.gatech.edu/research/bioengineering>
- CAE and Design: <http://www.me.gatech.edu/research/cae>
- Fluid Mechanics: <http://www.me.gatech.edu/research/fluid>
- Heat Transfer, Combustion & Energy Systems: [http://www.me.gatech.edu/research/heat\\_transfer](http://www.me.gatech.edu/research/heat_transfer)
- Manufacturing: <http://www.me.gatech.edu/research/manufacturing>
- Mechanics of Materials: <http://www.me.gatech.edu/research/mechanics>
- Medical Physics: [http://www.me.gatech.edu/research/medical\\_physics](http://www.me.gatech.edu/research/medical_physics)
- Micro & Nano Engineering: <http://www.me.gatech.edu/research/microandnano>
- Nuclear & Radiological Engineering: <http://www.me.gatech.edu/research/nre>
- Tribology: <http://www.me.gatech.edu/research/tribology>
  
- UNDERGRADUATE RESEARCH: <http://www.me.gatech.edu/undergraduate/research>
- CENTERS / LABS: <http://www.me.gatech.edu/research/labs>
- PATENTS: <http://www.me.gatech.edu/about/pat-index>

## 1.21 Courses

Graduate Courses are listed below. To view the syllabus for a course, go to: <http://me.gatech.edu/graduate/courses/me####>, filling in the four digit course number at the end of the URL.

[ME 6101](#) Engineering Design

[ME 6102](#) Designing Open Engineering Systems

[ME 6103](#) Optimization in Engineering Design  
[ME 6104](#) Computer-Aided Design  
[ME 6105](#) Modeling and Simulation in Design  
[ME 6124](#) Finite-Element Method: Theory and Practice  
[ME 6201](#) Principles of Continuum Mechanics  
[ME 6203](#) Inelastic Deformation of Solids  
[ME 6204](#) Micromechanics of Materials  
[ME 6222](#) Manufacturing Processes and Systems  
[ME 6223](#) Automated Manufacturing Process Planning  
[ME 6224](#) Machine Tool Analysis and Control  
[ME 6225](#) Metrology and Measurement Systems  
[ME 6229](#) Introduction to Microelectromechanical Systems  
[ME 6242](#) Mechanics of Contact  
[ME 6243](#) Fluid Film Lubrication  
[ME 6244](#) Rotordynamics  
[ME 6301](#) Conduction Heat Transfer  
[ME 6302](#) Convection Heat Transfer  
[ME 6303](#) Thermal Radiation Heat Transfer  
[ME 6304](#) Principles of Thermodynamics  
[ME 6305](#) Applications of Thermodynamics  
[ME 6401](#) Linear Control Systems  
[ME 6402](#) Nonlinear Control Systems  
[ME 6403](#) Digital Control Systems  
[ME 6404](#) Advanced Control System Design and Implementation  
[ME 6405](#) Introduction to Mechatronics  
[ME 6406](#) Machine Vision  
[ME 6407](#) Robotics  
[ME 6408](#) Advanced Mechatronics  
[ME 6441](#) Dynamics of Mechanical Systems  
[ME 6442](#) Vibration of Mechanical Systems  
[ME 6444](#) Nonlinear Systems  
[ME 6449](#) Acoustic Transducers and Signal Analysis

[ME 6452](#) Wave Propagation in Solids  
[ME 6601](#) Introduction to Fluid Mechanics  
[ME 6602](#) Viscous Flow  
[ME 6622](#) Experimental Methods  
[ME 6753](#) Principles of Management for Engineers  
[ME 6754](#) Engineering Database Management Systems  
[ME 6758](#) Numerical Methods in Mechanical Engineering  
[ME 6760](#) Acoustics I  
[ME 6761](#) Acoustics II  
[ME 6762](#) Applied Acoustics  
[ME 6765](#) Kinetics and Thermodynamics of Gases  
[ME 6766](#) Combustion  
[ME 6768](#) Polymer Structure, Physical Properties and Characterization  
[ME 6769](#) Linear Elasticity  
[ME 6770](#) Energy and Variational Methods in Elasticity and Plasticity  
[ME 6776](#) Integrated Low-Cost Microelectronics Systems Packaging  
[ME 6779](#) Therm Pkg-Micro/Nano Systems  
[ME 6782](#) Cellular Engineering  
ME 6784 Cardiovascular Biomechanics  
[ME 6789](#) Technology Ventures  
[ME 6792](#) Manufacturing Seminar  
[ME 6793](#) Systems Pathophysiology  
[ME 6794](#) Tissue Engineering  
[ME 6796](#) Structure-Property Relationships in Materials  
[ME 6799](#) Legal Issues in Technology Transfer  
[ME 7000](#) Master's Thesis  
[ME 7201](#) Computational Mechanics of Materials  
[ME 7203](#) Advanced Constitutive Relations for Solids  
[ME 7227](#) Rapid Prototyping in Engineering  
[ME 7301](#) Transport Phenomena in Multiphase Flow  
[ME 7442](#) Vibration of Continuous Systems  
[ME 7602](#) Hydrodynamic Stability

[ME 7751](#) Computational Fluid Mechanics  
[ME 7757](#) Teaching Practicum  
[ME 7771](#) Mechanics of Polymer Solids and Fluids  
[ME 7772](#) Fundamentals of Fracture Mechanics  
[ME 7774](#) Fatigue of Materials and Structures  
[ME 7775](#) Topics in Fracture and Fatigue of Metallic and Composite Structures  
[ME 8801-2-3-4-5-6](#) Special Topics in Manufacturing  
[ME 8811-2-3-4-5-6](#) Special Topics in Computer-Aided Engineering  
[ME 8821-2-3-4-5-6](#) Special Topics in Tribology  
[ME 8831-2-3-4-5-6](#) Special Topics in Thermal Sciences  
[ME 8841-2-3-4-5-6](#) Special Topics in Automation and Mechatronics  
[ME 8851-2-3-4-5-6](#) Special Topics in Acoustics and Dynamics  
[ME 8861-2-3-4-5-6](#) Special Topics in Fluid Mechanics  
[ME 8871-2-3-4-5-6](#) Special Topics in Bioengineering  
[ME 8881-2-3-4-5-6](#) Special Topics in Mechanics of Materials  
[ME 8901-2-3-4-5-6](#) Special Problems in Manufacturing  
[ME 8911-2-3-4-5-6](#) Special Problems in Computer-Aided Engineering and Design  
[ME 8921-2-3-4-5-6](#) Special Problems in Tribology  
[ME 8931-2-3-4-5-6](#) Special Problems in Thermal Sciences  
[ME 8941-2-3-4-5-6](#) Special Problems in Automation and Mechatronics  
[ME 8951-2-3-4-5-6](#) Special Problems in Acoustics and Dynamics  
[ME 8961-2-3-4-5-6](#) Special Problems in Fluid Mechanics  
[ME 8971-2-3-4-5-6](#) Special Problems in Bioengineering  
[ME 8981-2-3-4-5-6](#) Special Problems in Mechanics of Materials  
[ME 8997](#) Teaching Assistantship  
[ME 8998](#) Research Assistant  
[ME 9000](#) Doctoral Thesis  
  
[NRE 6301](#) Reactor Engineering  
[NRE 7103](#) Advanced Plasma Physics  
[NRE 7203](#) Advanced Reactor Physics

## 1.22 Financial Aid

A timetable of actions for those who receive financial aid is presented below. *You bear the responsibility to see that all the necessary forms are submitted and approved by the appropriate deadlines.*

Registration	Must be a full-time student. Continuing students should register during Phase I registration. GRA/GTA's must have 12 credit hours on a letter-grade basis or thesis/dissertation hours on a pass/fail basis.
Woodruff School Semester Support Form	Must be submitted on an Electronic Semester Support Form. The semester before support is needed an e-mail reminder will be sent to all currently enrolled students and all students who are already receiving some type of financial support.

Three types of financial aid are available to qualified graduate students:

- Graduate Research Assistantships (GRA's) and Graduate Teaching Assistantships (GTA's);
- Full Fellowships;

These students are granted out-of-state tuition waivers as required. GRA's, GTA's, and most fellowships are awarded on the basis of academic merit and performance and not on the basis of need. If you have a demonstrated need, you may apply to the Georgia Tech Financial Aid Office under the work-study program or for student loans. See [www.finaid.gatech.edu](http://www.finaid.gatech.edu)

### 1.22.1 Graduate Research Assistantships (GRA) and Graduate Teaching Assistantships (GTA)

See section 1.17 for detailed information on this topic.

### 1.22.2 Financial Support Actions

Continuation of financial aid is contingent upon adequate academic progress and the availability of funds. Adequate progress is demonstrated if it appears that the proposed master's program can be completed within one to two years of full-time study or the proposed Ph.D. program can be completed within three to four years beyond the master's degree. A grade point average of at least 3.0 for M.S. students or 3.3 for Ph.D. students is required for the continuation of financial aid. For the doctoral student, performance on the qualifying exam and the oral presentation of the proposed thesis topic as well as conference and journal publications of research are also important indicators of progress. Continuation of financial aid for international students is also contingent upon maintaining a current Visa.

For financial support actions, please go to GradWorks and take the appropriate action. GradWorks is located at:

**<https://gtapps.gatech.edu/gtgradworks/>**

The GradWorks system should be used for:

- a) All new hiring actions, to include requests for GTA positions for future terms.
- b) Renewing financial support for future semesters.
- c) Changing financial account numbers or stipend amounts.
- d) Terminating financial support.

#### 1.22.2 Graduate Conference Funds for Travel:

Graduate Student Government Association Provides funding every other academic year for conferences.

<http://sga.gatech.edu/grad/?q=content/graduate-conference-funds>

The School of Engineering will match a set amount if you fill out the following form:

<http://www.sga2.gatech.edu/grad/sites/default/files/uploads/docs/Documents/grad-conf-fund-eng.pdf>

#### 1.22.3 Other Financial Aid Sources

U. S. (Stafford) and State Government loans are available to American citizens and permanent residents only; they require advance planning. For more information, view **[www.finaid.gatech.edu/loan-steps](http://www.finaid.gatech.edu/loan-steps)**

A variety of privately funded loan programs are available to international students. Please see:

**[www.oie.gatech.edu/isss/general/faq.php#17\\_3](http://www.oie.gatech.edu/isss/general/faq.php#17_3)**

#### 1.22.4 Graduate Cooperative Program

The Graduate Cooperative Program provides an excellent opportunity for Georgia Tech students to finance their graduate studies. Students participating in this program work at least two terms in industry in a professional capacity before receiving the master's (or Ph.D.) degree. The program is flexible with regard to the timing of the work semesters, the rate and method of payment, and the amount of academic credit (thesis or special problem) that can be received for activities during work semesters. These matters are arranged between the student and the employer. Application for the Graduate Cooperative Program is made through **[www.coop.gatech.edu](http://www.coop.gatech.edu)**

#### 1.22.5 Woodruff School Doctoral Teaching Intern Program

The Doctoral Teaching Intern Program is intended to give doctoral students who plan to pursue an academic career some experience in conducting a typical undergraduate class in mechanical engineering under the mentorship of a faculty member who is a well-regarded classroom teacher. It is the intention of the Woodruff School to help those doctoral students to get the best possible background to help them perform well in their professional endeavors. This internship is highly selective and will be limited to one or two per year and will be contingent upon the availability of funding. A student can only serve as a Woodruff School Doctoral Teaching Intern once.

**Description of Activities** The Woodruff School doctoral teaching intern will assist a regular faculty member in conducting a typical, required undergraduate course in the School of Mechanical Engineering. The professor-in-charge will be one who is an excellent classroom teacher. The intern is expected to work with the faculty member on all facets of conducting a class - reviewing the syllabus and assignments that are given, presenting up to one-third of the class lectures in the presence of the faculty member so that the faculty member can critique the intern, and assisting the instructor in making up and grading homework assignments and examinations, including the final examination. The intern will also work hand-in-hand with the faculty member in establishing the final course grades for the students in the class. With rare exception, the intern will not be assigned to teach the class under the mentorship of his/her thesis advisor. The intent of this program is to give the interns a broadened experience of working with various faculty members.

**Application** An application form is available online. Woodruff School Ph.D. students who have passed the qualifying exams and presented a Ph.D. thesis proposal are eligible each semester to apply and compete to become a teaching intern. The application requires the endorsement of your thesis advisor, as well as the instructor under which you will work. The final selection of the intern will be made by the Chair of the Woodruff School.

**Finances** The intern will be supported with a stipend equivalent to the standard doctoral student GRA stipend current in the Woodruff School for someone at the student's level in the graduate program. The funds will come from the Woodruff Endowment.

#### 1.22.6 Outside Employment

Outside employment for Woodruff School students (with financial aid) is prohibited **except** for those who have received permission from the Associate Chair for Graduate Studies. This rule applies to all full-time



students (GRA's, GTA's, and fellowship holders). A request to engage in outside employment should be submitted on the **Outside Employment Request for Woodruff Graduate Students**. Have your advisor approve your employment by signing the form. As a rule, the work should be of a professional nature, and must not exceed eight hours per week.

#### Outside Employment for International Students

If you hold an F-1 or J-1 visa and seek outside employment, contact the Office of International Education at (404) 894-7475. The rules and regulations governing the employment of students on visas may be found at [www.oie.gatech.edu](http://www.oie.gatech.edu)

#### 1.22.7 FAQ: Coop/Internships

**Q.** I would like to participate in an internship and will not be taking classes. What do I need to do to make sure I retain my student status for when I return to campus? What is the difference between graduate co-op and graduate internships?

**A.** *At the graduate level, internships and co-op work assignments mean the same thing at Georgia Tech. Although graduate students may work internships without enrollment credit at Georgia Tech, co-op/internships registered through the Division of Professional Practice's Graduate Co-op Program are recorded on your transcript as full-time, non-fee based, audit credit. This allows you to maintain your enrollment status while you gain full-time work experience in your field.*

### 1.23 Fellowships

Woodruff School graduate students are strongly encouraged to apply for competitive national fellowships. View [fellowships.gatech.edu](http://fellowships.gatech.edu) for a complete list of fellowships.

In addition, the University of Illinois maintains a web site on graduate fellowships through the IRIS database. You may search IRIS from any computer at Georgia Tech. See [www.library.uiuc.edu/iris](http://www.library.uiuc.edu/iris)

#### 1.23.1 Writing and Presentation Assistance

The Woodruff School provides writing and presentation assistance for graduate students through the Frank K. Webb Program in Professional Communication, coordinated by Dr. Jeffrey Donnell (Ph.D. in English, Emory University). Dr. Donnell is available to review technical manuscripts, to help you prepare and rehearse technical presentations, and help you prepare graduate fellowship applications. Contact Dr. Donnell at [jeff.donnell@me.gatech.edu](mailto:jeff.donnell@me.gatech.edu) or go to MRDC, Room 3104.



## 2 Master's Degree

To obtain the M.S.M.E., M.S.N.E., M.S.M.P., M.S.BIOE., M.S.P.S.E., or M.S. degree, you must complete an approved program of study for the designated degree. If you wish to pursue interdisciplinary areas with substantial course work outside the Woodruff School, then the undesignated M.S. degree is your goal and you should submit the relevant program of study. You are encouraged to consult with your advisor about the program of study most advantageous to your chosen career. Additionally, we encourage you to examine the Georgia Tech Catalog, the many Woodruff School publications, and our web sites to appreciate the myriad opportunities available. You may also use the resources of other schools at Georgia Tech to design your program of study.

You should plan your activities to complete the Master's degree program in one to two years or four to six semesters of full-time study. All course work is elective, but is subject to the requirements for breadth, depth, and level. There are no language requirements for any graduate degree.

### 2.1 Degree Requirements

#### 2.1.1 M.S. in Mechanical Engineering (M.S.M.E.)

The Master of Science degree in Mechanical Engineering (M.S.M.E.) has the following 30 minimum course credit-hour requirements. Only 6 credits at the 4000 level are permitted, the remaining credits must be 6000 level or above. It is a very flexible program which includes a thesis and non-thesis options.

	With Thesis	Without Thesis
Coherent Major Area	12	21
Coherent Minor Area	6	6
(All course work in the Coherent Major and Minor Areas must be from the College of Computing, Science, and/or Engineering. The minor will not appear on transcripts or degree documentation.)		
Mathematics	3	3
Thesis (ME 7000)	9	0
<b>Total for Degree</b>	<b>30</b>	<b>30</b>

Only courses from the School of Mathematics fulfill the mathematics requirement (3 credits).

The minimum coursework requirements must also conform to these criteria:

	<b>With Thesis</b>	<b>Without Thesis</b>
ME xxxx Credits	9	18
Credits at 6000- Level or above	15	24
Special Problem Credit (ME 89xx)	0	0 or 3

ME xxxx credits do not include thesis credits (ME 7000).

The coherent minor area must be distinctly different from the major area. Note that ME 6753, ME 6789, and ME 6799 may only be used to satisfy the course work in the coherent minor area. COA 8685-Building Simulation Seminar, COA 8833-Computational Simulation of Build Design, MGT 6165, and BC 6650 may be included in the coherent minor area. ME 6753 and BC 6650 may not be counted together in the coherent minor area.

The items listed below cannot be used to meet the course requirements for the M.S.M.E. degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a non-letter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.

#### 2.1.2 M.S. in Nuclear Engineering (M.S.N.E.)

The Master of Science degree in Nuclear Engineering (M.S.N.E.) has both thesis and non-thesis options. In addition, students have the option of adding a concentration in Nuclear Enterprise Management (NEM). Depending upon the track chosen, the M.S.N.E. requires completion of 30 or 36 credit hours. No more than six semester hours at the 4000 level can be counted toward the degree requirement.

The M.S.N.E. degree (non-NEM) has the following minimum course credit-hour requirements.

	<b>With Thesis</b>	<b>Without Thesis</b>
Major Area	12	15
Mathematics	3	3
Electives	6	12
Thesis (NRE 7000)	9	0
<b>Total for Degree</b>	<b>30</b>	<b>30</b>

The required courses for this degree are:

- NRE 6101 Transport Fundamentals
- NRE 6102 Plasma Physics
- NRE 6201 Reactor Physics
- NRE 6401 Advanced Nuclear Engineering Design (required for the non-thesis option)
- NRE 6756 Radiation Physics

NRE6102 (Plasma Physics), NRE6201 (Reactor Physics), and NRE6756 (Radiation Physics) are each the second course in a two-course sequence; knowledge of the material covered in the first course in each sequence is assumed. The following are also recommended:

- Students who have not had an undergraduate course covering the material in NRE4610 (Introduction to Fusion) are advised to take that course prior to taking NRE6102
- Students who have not had an undergraduate course covering the material in NRE4204 (Nuclear Reactor Physics) are advised to take that course as a make-up prior to taking NRE6201
- Students who have not had an undergraduate course covering the material in NRE 3301 (Radiation Physics) are advised to take that course as a make-up prior to taking NRE6756
- Knowledge of mathematics at or above the level found in advanced engineering mathematics courses is required. This includes but is not limited to familiarity with: 1) solutions of PDE boundary value problems by separation of variables and eigenfunction expansion, 2) Fourier and LaPlace transforms, and 3) orthogonal polynomial expansions. Knowledge of vectors, tensors and complex analysis is desirable. MATH 4581 or the equivalent is recommended.

### 2.1.3 M.S. in Bioengineering (M.S.BIOE.)

The BioE master's degree requires 21 hours of coursework comprised of a mixture of bioscience, mathematics, bioengineering, traditional engineering and elective classes and successful completion of a master's Thesis. Some of Georgia Tech schools offer a non-thesis master's, though most participants are enrolled via Georgia Tech's Bachelors/master's program.

Prospective students do not need to apply for a master's to pursue a PhD, and are discouraged from doing so if the PhD is their intended final degree. While individual schools vary, students are generally admitted to the master's program with no guaranty of financial support. Admission to the master's program is as competitive as the PhD program.

The M.S.BIOE. degree has the following course credit-hour requirements.

	<b>With Thesis</b>
Engineering Fundamentals	3-6
Biological Sciences	3-6
Engineering Mathematics	3
Bioengineering & Tech Elective	9
Responsible Code of Conduct	-
Thesis	9
<b>Total for Degree</b>	<b>30</b>

21 hours of coursework - A balance between engineering fundamentals and biological sciences coursework is determined by the student's undergraduate background and is tailored for your success! Thesis will be conducted at the end of the 2nd year.

#### 2.1.4 M.S. in Medical Physics (M.S.M.P.)

The Master of Science in Medical Physics (M.S.M.P.) degree program is intended to prepare students for productive careers as medical physicists. The program is designed to be completed in one and one-half years by well-motivated, full-time students. The M.S.M.P. has the following course credit-hour requirements:

	<b>With Thesis</b>	<b>Without Thesis</b>
Required Medical Physics Courses	28	28
Elective Medical Physics Courses	0	3
Other Elective Courses	0	6
Clinical Rotation	3	3
Thesis	9	0
<b>Total for Degree</b>	<b>40</b>	<b>40</b>

Some suggested elective courses for this degree are:

- MP 880X Special Topics in Medical Physics
- MP 890X Special Problems in Medical Physics
- BIOL 4015 Cancer Biology and Biotechnology
- ECE/BMED 6780 Medical Imaging Processing
- ECE/BMED 6786 Medical Imaging Systems
- ECE/BMED 6793 Systems Pathophysiology
- NRE/ME 6758 Numerical Methods
- NRE 6101 Transport Fundamentals
- NRE 6103 Computational Methods of Radiation Transport
- NRE 6105 Radiation Shielding

- NRE 6755 Radiological Assessment and Waste Management
- ISYE 6401 Statistical Modeling and Design of Experiments
- ISYE 6411 Fundamentals of Statistics with Applications
- ISYE 6644 Simulation
- ISYE 6661 Optimization I
- ISYE 6739 Basic Statistical Methods
- PUBP 6010 Ethics, Epistemology, and Public Policy
- PUBP 6310 Environmental Issues
- PUBP 6314 Policy Tools for Environmental Management
- PUBP 6324 Environmental and Technological Risk Management
- PUBP 6401 Science Technology and Public Policy

#### Clinical Rotation (MP8104)

On-campus students will work with clinical medical physicists at Emory University's hospital and clinic or at the Memorial Health University Medical Center in Savannah, Georgia. The clinical rotation class topics will be distributed in three areas:

- Nuclear Medicine
- Diagnostic Imaging
- Radiation Therapy

Distance-Learning (DL) students are required to fulfill the clinical rotations and laboratories at their own (or nearby) facilities. In this case, the DL student must first submit the necessary information for approval to the course coordinator before admittance into the program.

Prerequisites for MP 8104 are MP 4750, MP 6204, MP 6402, MP 6407. It is also desirable that student have taken MP 6300 and MP 6757 before registering for the clinical rotation course. All students must have obtained a C or higher in four required courses to register for the clinical rotation course. All students must have obtained a C or higher in four required courses to register for the clinical rotation course.

No more than six semester hours at the 4000 level can be counted toward the degree requirements. The items listed below cannot be used to meet the course requirements for the M.S.M.P. degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a non-letter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- CETL course work

Distance learning (DL) students are required to travel to Georgia Tech to complete any course with an on-campus experimental laboratory requirement and to complete the oral examinations for the clinical rotation courses.

### ABR Physics Requirement

Students of the MP program are expected to satisfy the American Board of Radiology (ABR) physics requirement prior to graduation from the program. Those who have a Bachelors' degree in physics or applied physics automatically satisfies the ABR requirement to apply for part 1 of the Radiologic Physics exam. Other physical science and engineering bachelors' degrees are eligible if the appropriate fundamental physics courses have been completed equivalent to a minor in physics. A minor in physics includes general physics with calculus courses and at least three upper level (3000 level or higher) courses. The faculty of the MP program have developed the following guideline to assist you in meeting the ABR physics requirement.

Similarly named upper level engineering or science courses from other departments in the following areas listed may be counted as equivalent to a physics course in meeting the upper level physics requirements:

- Electricity and Magnetism
- Atomic Physics/Nuclear Physics
- Quantum Mechanics
- Mechanics
- Thermodynamics / Statistical Physics

### Sample 3-Semester Curriculum (Non-thesis Option) for On-Campus Students

<b>First Year</b>		
	<b>Courses</b>	<b>Credit</b>
<b>Fall</b>	Fall Radiation Physics (NRE/MP 6756) <sub>a</sub>	3
	Radiation Biology & Oncology (MP 6407) <sub>b</sub>	3
	Radiation Protection & Dosimetry (MP 6402)	2
	Radiological Anatomy (MP 6300)	1
	Elective	3
	<b>Semester Total</b>	<b>12</b>
<b>Spring</b>	Radiation Detection (MP/NRE 6757)	3
	Diagnostic Imaging Physics (MP 4750)	3
	Radiation Therapy Physics (MP 6204)	4
	Seminar in Medical Physics I (MP 8011)	1
	Elective	3
	<b>Semester Total</b>	<b>14</b>

<b>Summer</b>	Clinical Rotation (MP 8104) <sub>c</sub>	3
	<b>Semester Total</b>	<b>3</b>
<b>Second Year</b>		
	<b>Courses</b>	<b>Credit</b>
<b>Fall</b>	Fall Nuclear Medicine Physics (MP 6101)	3
	Medical Health Physics (MP 6401)	3
	Radiation Therapy Physics Laboratory (MP 6203)	1
	Seminar in Medical Physics II (MP 8012)	1
	Elective	3
	<b>Semester Total</b>	<b>11</b>
<b>Total Credit Hours</b>		<b>40</b>

- Students who have not had an undergraduate course in radiation physics or the equivalent covering the material in NRE 3301 are advised to take that course as a make-up prior to NRE/MP6756. NRE 3301 cannot be counted towards the credit hour requirement.
- Biology 3751 (3 credit hours) is a prerequisite for MP 6405 which can be taken concurrently with MP 6405 if needed. Biology 3751 cannot be counted toward the credit hour requirement.
- Prerequisites: MP 4750, MP 6204, MP 6402, and MP 6407.

#### 2.1.5 M.S. in Paper Science and Engineering (M.S.P.S.)

Students in the master's program who are interested in a unique multidisciplinary program in biotechnology and (M.S.P.S.E.) engineering sciences of paper and tissue production can select their degree with a major or minor in Paper Science and Engineering (PSE). These multidisciplinary degrees are supported by four Schools (referred to as Home Schools), namely the Schools of Mechanical Engineering, Chemical and Biomolecular Engineering, Materials Science and Engineering, and Chemistry in conjunction with the Institute of Paper Science and Technology at Georgia Tech.

The Master and Ph.D. degree programs with a major or minor in PSE in the Woodruff School of Mechanical Engineering provide a multidisciplinary approach to biotechnology of natural fiber production, manufacturing of paper and tissue, and energy production through woody biomass. Students admitted to the Master of Science program in PSE in the School of Mechanical Engineering must have a B.S. degree in engineering, science, or mathematics, and satisfy the admission requirements of the Woodruff School.



The minimum PSE course requirements are the same for students who select their major in ME and minor in PSE or those who select their major in PSE. All PSE students must complete 12 credits of PSE coursework. These 12 credits constitute a PSE minor or, when combined with other courses determined by the student's advisor from the Home School, constitute the curriculum for a PSE degree. The Master of Science degree with major or minor in PSE has the following minimum course credit-hour requirements. Of the 33 total hours required, 27 hours must be at the 6000 level or above and six credit hours must be at the 4000 level or above.

	<b>With Thesis</b>	<b>Without Thesis</b>
Required PSE Core Courses (listed below)	6	6
Required PSF Elective Courses (listed below)	6	6
Electives in a coherent ME or Multidisciplinary area as designed and approved by the student's advisor	9	18
Mathematics (from courses which satisfy the ME Math requirements, for example ME 6443 or ME 6758)	3	3
Thesis	9	0
<b>Total for Degree</b>	<b>33</b>	<b>33</b>

### Courses

#### PSE Core Courses (each course is 3 credit hours)

(Required of all students in all Home Schools with a major or minor in PSE)

- ChBE/ME 6741: Pulp and Paper Manufacture I
- ChBE/ME 6742: Pulp and Paper Manufacture II

#### PSE Elective Courses (each course is 3 credit hours)

Students in the Woodruff School with a major in ME and a minor in PSE or with a major in PSE are required to take:

- ME 6281: Mechanics of Paper Forming and Coating
- and one course from the following list:
- ChBE 6232: Chemical Engineering Processes in Pulp & Paper Manufacturing
  - MSE 8803L: Environmental Degradation of Materials
  - CHEM 8803: Pulping and Bleaching Chemistry

### Suggested Electives

Students in the Woodruff School with a major or minor in PSE are required to take 9 (18 without thesis) credits in a coherent group of courses in Mechanical Engineering or multidisciplinary areas supporting their thesis project as approved by their advisor. A list of suggested electives is provided below. Other electives approved by the student's advisor can be included.

- ME 6601: Introduction to Fluid Mechanics
- ME 6602: Viscous Flow
- ME 6768: Polymer Structure, Physical Properties, and Characterization
- ME 7301: Transport Phenomena in Multiphase Flow
- ME 7751: Computational Fluid Dynamics
- ME 7771: Mechanics of Polymer Solids and Fluids
- CEE 6293: Hydrodynamics Instability and Turbulence
- ME 6201: Principles of Continuum Mechanics
- ME 6203: Inelastic Deformation of Solids
- ME 6301: Conduction Heat Transfer
- ME 6302: Convection Heat Transfer
- ME 6304: Principles of Thermodynamics

### PSE Course Requirements for PSE Fellows

All students funded on a PSE Fellowship must complete 12 credits of PSE coursework. These 12 credits constitute a PSE minor or, when combined with other courses determined by the Home School, constitute the curriculum for a PSE degree. Students completing the PSE minor must file the Certificate of Completion of PSE Coursework form with the Home School as well as the IPST Director's office prior to graduation.

### PSE Course Descriptions

Course	Description	Hours
<b>ChBE/ME 6741</b>	<b>Pulp and Paper Manufacture I</b> The fundamentals of pulp and paper technology including unit operations involved in the sequence leading up to the headbox in a paper mill. Applications are explored and augmented by field trips and recent case studies.	3 Credit Hours 3 Lecture Hours
<b>ChBE/ME 6742</b>	<b>Pulp and Paper Manufacture II</b> Papermaking technology from a multidisciplinary engineering perspective with emphasis on relationships between transport and interaction of fiber suspensions on the final properties of the finished paper.	3 Credit Hours 3 Lecture Hours

<b>ChBE 6232</b>	<b>Chemical Engineering Processes in Pulp &amp; Paper Manufacturing</b> The science and engineering of processes in the pulp and paper industry, including advanced bleaching processes, and chemical recovery processes. Environmental modeling and papermaking chemistry will also be covered.	3 Credit Hours 3 Lecture Hours
<b>ME 6281</b>	<b>Mechanics of Paper Forming and Coating</b> Fundamentals of multiphase flow in paper forming and coating processes, and their impact on the physical properties of composite fiber structures and surface characteristics. Flow characteristics of suspensions in process components are analyzed in depth.	3 Credit Hours 3 Lecture Hours
<b>Chem 8833</b>	<b>Pulping and Bleaching Chemistry</b> Fundamental chemistry associated with pulping and bleaching of wood. Includes detailed analysis of the chemical structure of wood components, the reactions of pulping and bleaching reagents with typical carbohydrate and lignin functional groups, and the factors that govern the degree of lignin vs carbohydrate degradation.	3 Credit Hours 3 Lecture Hours
<b>MSE 8803L</b>	<b>Environmental Degradation of Materials</b> Basic interactions of materials with their environment. Degradation of the properties of materials when exposed to different environments. Includes fundamentals of corrosion, with appropriate examples from bleach plants, boilers, paper machines, and water treatment plants.	3 Credit Hours 3 Lecture Hours

#### 2.1.6 Master of Science (M.S., an undesignated degree)

The undesignated master's degree (M.S.) enables you to pursue a program of highly interdisciplinary course work. For the undesignated degree, the major area is a coherent field of interest in the Woodruff School, but courses taken in the major area need not all have ME designations. Examples of major areas are acoustics and dynamics, bioengineering, materials science, MEMS, and thermal sciences. The list

of major areas is limited only by the current interests of the faculty in the Woodruff School. The requirement for a major area is motivated by the need to have some coherent area of special expertise. ME 6753, ME 6789, and ME 6799 cannot be used to meet this requirement. CETL classes also do not meet these respective course requirements.

The Master of Science has the following 30 minimum course credit-hour requirements. Only 6 credits at the 4000 level are permitted, the remaining credits must be 6000 level or above. The minimum coursework requirements included in the proposed program must also conform to the following criteria:

	<b>With Thesis</b>	<b>Without Thesis</b>
Coherent Major Area	12	21
Coherent Minor Area	6	6
(All course work in the Coherent Major and Minor Areas must be from the College of Computing, Science, and/or Engineering. The minor will not appear on transcripts or degree documentation.)		
Mathematics	3	3
Thesis (ME 7000)	9	0
<b>Total for Degree</b>	<b>30</b>	<b>30</b>

The minimum coursework requirements must also conform to these criteria:

	<b>With Thesis</b>	<b>Without Thesis</b>
ME xxxx Credits	9	18
Credits at 6000- Level or above	15	24
Special Problem Credit (ME 89xx)	0	0 or 3

Only courses from the School of Mathematics fulfill the mathematics requirement. ME xxxx credits do not include special problem credits (ME 89xx). The items listed below cannot be used to meet the course requirements for the M.S. (Undesignated) degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a non-letter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- ME7785
- CETL course work
- Professional Master's Degree coursework

### 2.1.7 Joint M.S. in Mechanical Engineering (M.S.M.E) with Universität Stuttgart

[http://me.gatech.edu/files/grad/ME\\_jointGradProgram](http://me.gatech.edu/files/grad/ME_jointGradProgram)

## 2.2 Program of Study

Mandatory for all master's Students

A Proposed Master's Program of Study form must be submitted for approval during your first semester of study at the Woodruff School.

In preparing your program of study, be aware that graduate courses are usually offered only once a year and, in some cases, less frequently (see Appendix A). Submit your program of study electronically. It will be routed to your advisor for approval and then to the Office of Student Services for final approval. You will be provided e-mails and links to monitor the approval process. If the program of study is not approved, the reasons will be noted.

Any deviation from your proposed program of study should be approved in advance of taking the new course work by submitting a revised program of study. These revisions may be submitted at any time, except the semester in which you are graduating. Revisions during the semester in which you are graduating must be made on or before the first day of classes. This will allow time for the review and approval process prior to the close of registration for classes.

To initiate your MSME Program of Study submission, please go to the following link and follow the online instructions:

<https://www2.me.gatech.edu/graddb/forms/student/>

If you note any problems with this automated process, please notify the Office of Student Services at (404) 894-3204 or send an email to:

[computer.support@me.gatech.edu](mailto:computer.support@me.gatech.edu).

### 2.2.1 FAQ: Program of Study

1. **Q.** When should I submit my Program of Study?  
**A.** *The Proposed Program of Study should be submitted electronically via the handbook:*  
*(<https://www2.me.gatech.edu/graddb/forms/student/>) by the end of the first term. It should be updated whenever changes are made.*
2. **Q.** Do you allow transfer credit from other schools?  
**A.** *Any transfer of credit must be requested during your first semester in residence at Georgia Tech. You may receive up to six semester hours of transfer credit toward the M.S. degree for graduate-level courses taken at an accredited institution in the United States or Canada and not used for credit toward another degree. You must supply a current transcript of these courses for the evaluation.*

3. **Q.** I entered the Ph.D. program with an M.S. from another school. Can I use any of the M.S. classes toward the Ph.D. coursework requirement?  
**A.** Yes, you may use any course work that you have earned beyond the BS degree. You may also use up to nine hours of credit from your thesis if you completed an MS thesis option.
4. **Q.** Can Pass/Fail courses be counted towards the degree requirement?  
**A.** No, only letter grade courses are allowed.

## 2.3 Guidelines for Registration

### 2.3.1 Courses

A list of the courses by number and their frequency of offering may be found in Appendix A.

A list of the courses in each of the research areas in the Woodruff School may be found in Appendix B.

A list of distance-learning course projections may be found in Appendix C.

For the listing of all classes to be offered each semester and complete registration information, see the On-Line Student Computer Assisted Registration (OSCAR). OSCAR also has instructions, class schedules, and academic calendar information: <https://oscar.gatech.edu>.

### 2.3.2 Registration

To register for courses, please login to OSCAR.

For part-time students, the minimum load is three credit hours.

Full-time enrollment is required of all students receiving financial aid and for international students on visas. You must register for a minimum of twelve hours of letter-grade and/or pass/fail thesis or dissertation credit hours to maintain your status as a full-time student. Failure to register on time might delay the payment of a fellowship stipend or tuition payment.

Research assistants doing thesis research must sign up for thesis hours (ME/NRE/MP 7000 for the MS and ME/NRE 9000 for the Ph.D.). Graduate research assistants conducting research should register for letter-grade course work (usually six to nine hours) and sufficient thesis hours to bring the total load to 21 credit hours. Teaching assistants may add three audit

hours in recognition of the teaching assignment (ME/NRE 8997). The Institute Policy on Hour Loads for Graduate Students is found at: [www.gradadmiss.gatech.edu/thesis/policies/hr\\_load\\_grad.pdf](http://www.gradadmiss.gatech.edu/thesis/policies/hr_load_grad.pdf)

For more registration information, please go to: <http://me.gatech.edu/graduate/registration>

### 2.3.3 Enrollment Reduction or Enrollment Waiver

Students must be registered for a minimum of three credit hours at all times, except that thesis students may enroll for one hour of 7000/9000 in the semester of graduation. This Enrollment Reduction may be used only once.

Students who have met all requirements for graduation before the last day of registration for the graduation term and who were registered the preceding semester may be eligible for an Enrollment Waiver. The Enrollment Waiver must be submitted before the first day of classes. You must also reactivate your degree petition at the same time as you submit the enrollment waiver. The waiver must be signed by your advisor and the Associate Chair for Graduate Studies.

Enrollment Waiver form: [http://registrar.gatech.edu/docs/pdf/Enrollment\\_Waiver\\_form.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment_Waiver_form.pdf)

Deadline for Enrollment Waiver: <http://www.grad.gatech.edu/theses-dissertations-deadlines>

## 2.4 **Grades and Credit Hours**

As a master's degree student, you must maintain overall and semester grade point averages (GPA) of at least 3.0 to maintain good academic standing. In addition, the GPA for courses on your approved program of study must be 3.0 or higher. If your GPA drops below 3.0, you will be given two semesters in residence at Georgia Tech to raise your grade point average to good academic standing. Failure to do so will result in your being dropped from the program. You must earn a graduate grade point average of at least 3.0 or higher and satisfy all remaining requirements to be certified for the master's degree.

A new graduate student (unless currently enrolled as a Georgia Tech undergraduate) who participates in the Graduate Cooperative Program during his/her first semester of enrollment must register for one hour of ME 6798 (Cooperative Internship) in order to establish a record of enrollment. You must also pay the appropriate out-of-state or in-state tuition and fees.

If you complete both the bachelor's and master's degrees in the same discipline in the Woodruff School, you may use up to six credit hours of graduate-level course work in the major discipline for both degrees. To qualify for this option,

you must complete the undergraduate degree with a cumulative GPA of 3.5 or higher and complete the master's degree within a two-year period from the award date of the bachelor's degree.

If you are pursuing dual master's degrees in Mechanical Engineering and Nuclear and Radiological Engineering (the M.S.M.E. and M.S.N.E.) you may double count the six hours of coursework used to fulfill the math/basic science minor requirement of both degrees.

In addition, the Woodruff School has a five-year BS/MS program for those undergraduate students who have a GPA of 3.5 or higher and wish to obtain a graduate degree. Final admission to the graduate program is contingent upon completion of the BSME degree at Georgia Tech with a GPA of 3.0 or higher. In addition, you must matriculate into the graduate program immediately (excluding summer semester) upon receipt of your B.S. degree. For details, about the BS/MS program: <http://me.gatech.edu/undergraduate/bsms>

## **2.5 Special Problem Courses**

A special problem is an individual study in a specialized area under the direction of a member of the Woodruff School faculty. To register for ME/NRE/MP 89XX you must select a project and find a faculty member to direct it. The Special Problems Course form can be submitted online.

Each special problem must culminate in a written final report, which is to be submitted to the advisor for grading. All special problems are given a letter grade. Special Problem credits may not be included as part of the 30 hours of required coursework for master's thesis students.

The Special Problem Statement represents a contract between the student and the Woodruff School. Therefore, the tasks to be performed must be stated clearly and careful consideration should be given to the amount of course credit proposed for these tasks.

To initiate your Special Problem Course Form, please go to:

<https://www2.me.gatech.edu/graddb/forms/student/>

## **2.6 Transfer Credits**

Any transfer of credit must be requested during your first semester in residence at Georgia Tech. You may receive up to six semester hours of transfer credit toward the M.S. degree for graduate-level courses taken at an accredited institution in the United States or Canada and not used for credit toward another degree. You must supply a current transcript of these courses for evaluation.

Confer with the Associate Chair for Graduate Studies to ascertain whether the courses to be transferred are a logical part of your graduate program at Georgia



Tech. The courses should appear on the approved program of study form. If the courses are appropriate, you will need to give the Associate Chair for Graduate Studies a copy of your current transcript and some descriptive course materials, including catalog descriptions, syllabi, and textbooks, which will be used to evaluate the course. The School Chair or the Associate Chair for Graduate Studies will consult with faculty of the appropriate Georgia Tech department to determine the equivalent Georgia Tech course and the number of credit hours to be accepted. The Associate Chair for Graduate Studies prepares and approves the Non-Resident Credit Report. The completed form is sent directly to the Georgia Tech Registrar with the supporting documentation.

## **2.7 Petition to the Faculty**

The Institute Graduate Committee is responsible for all Institute-wide academic policies and degree requirements at the graduate level. In addition, they make decisions regarding all Institute-level graduate student petitions. These petitions include late withdrawals, changes in graduate standing, grade disputes, readmissions, and deadlines. You are strongly encouraged to discuss a petition with your academic advisor and the Associate Chair for Graduate Studies before it is filed: <http://registrar.gatech.edu/students/formlanding/pettofac.php>

## **2.8 Apply to Graduate**

### **Step 1. Due Dates for the On-Line Application for Graduation**

1. New (first-time) On-line Applications for Graduation are due the semester BEFORE you plan to graduate. (Ex. if you are graduating in Spring 2017, your on-line degree application is due in Fall 2016.)
2. A different on-line application for graduation is due for every semester that you attempt to graduate. If you do not graduate when planned, you must fill out another On-line Application for Graduation. Every Application for Graduation made after the initial request is called an On-line Reapplication for Graduation.
3. Application deadlines are found on the registrar's calendar, here: <http://registrar.gatech.edu/calendar/>
4. Students submit a separate On-line Application to Graduate for every semester they attempt to graduate.

### **Step 2. Verify Your Program of Study**

1. All graduate students (MS and PhD) must submit a Program of Study, here: <https://www2.me.gatech.edu/graddb/forms/student/>
2. If you have made any changes to your Program of Study, you must submit a new one for approval to the ME department here: <https://www2.me.gatech.edu/graddb/forms/student/>

3. *BSMS Students Only* - Classes that were taken at the undergraduate level will not show up in degreeworks. They must be manually added by your graduate advisor.

Step 3. Request to Graduate using the On-line Application for Graduation

1. Go to [www.buzzport.gatech.edu](http://www.buzzport.gatech.edu).
2. Select Registration - OSCAR.
3. Select Student Services & Financial Aid, then Student Records and then Apply to Graduate.
4. If you are asked to Select the Current Term, then select the *current semester (not the graduation semester)* in the drop down box. Press Continue.
5. You will now be on the *Curriculum Selection* screen. If your curriculum or minor are not correct, you must get that fixed immediately after applying to graduate.
  - Major: If your primary or secondary majors are not correct, then you must fill out a change of major form to correct it, found here: <http://www.registrar.gatech.edu/students/formlanding/changemajor.php>
6. Select the radio button for the program that you are graduating from. Press Continue. NOTE: Students who have two majors can only select one major at a time; you will need to complete this entire process for both majors.
7. On the next screen, select the graduation term in the drop down box. Press Continue.
8. On the *Diploma Name Selection* screen, select if you will be using your current name or a different name to appear on your diploma. Press Continue. NOTE: The registrar's office will review all requests to change names on the diploma.
9. The next screen will ask you to confirm your name. Press Continue.
10. On the *Diploma Mailing Address Selection* screen, select the address where you want to send your diploma. Press Continue. NOTE: Diplomas are mailed approximately 8 weeks after graduation so plan accordingly.
11. On the *Graduation Application Summary* screen, review all of your information carefully. When you are okay with the information on the screen click Submit Request.
12. On the next screen, click on the link at the bottom of the page. This will redirect you to Georgia Tech's Exit Survey. Fill out the survey.

Step 4. Verify that Your On-line Application for Graduation was Correctly Submitted

1. Go to [www.buzzport.gatech.edu](http://www.buzzport.gatech.edu).
2. Select Registration - OSCAR.
3. Select Student Services & Financial Aid, then Student Records and then View Application to Graduate.

4. If it asks you to select a semester, please select the semester that you planning to graduate.
5. If you correctly submitted the On-line Application to Graduate you will see it on that screen. If it says that No active graduation application exists then your application to graduate was not submitted.

#### Step 5. Track Your Graduation Status

1. Several times throughout your final semester you must verify the status of your application to graduate in OSCAR. From OSCAR, select Student Services & Financial Aid, then Student Records, and View Application to Graduate.
2. Go here for an explanation about the codes used in your graduation update: [http://me.gatech.edu/files/grad/degree\\_cert\\_codes.pdf](http://me.gatech.edu/files/grad/degree_cert_codes.pdf)
3. Two audits will be done for graduating students; the first audit will be done after phase 2 registration. The second audit will be done after final grades have posted.
4. After the first audit, students will have one month to fix any problems.

Any student who still has deficiencies after one month will automatically be inactivated (not graduating) and you will need to apply to graduate for the following semester. The only deficiencies which will not lead to an automatic inactivation are LOW GPA, PENDING TRANSFER CREDIT and REGISTRAR ADMINISTRATIVE DEFICIENCY.

## 2.9 Orientation Video for Distance Learning Students

The Orientation Video for Distance Learning Students can be found at this link:  
[https://mediaspace.gatech.edu/media/Getting+Started+at+the+Woodruff+Schoo/1\\_mrkjnyt1](https://mediaspace.gatech.edu/media/Getting+Started+at+the+Woodruff+Schoo/1_mrkjnyt1)

## 2.10 Checklist for the Master's Degree

GWW Woodruff School Checklist for MSME Thesis Program  
Georgia Institute of Technology

	TIMING	THESIS	COURSEWORK	FORMS
Before Graduation	Upon Arrival	Identify a Faculty Advisor		Submit a Program of Study
		Identify a Thesis Topic	Complete 12 course credits in Major Area	
		Identify Thesis Reading Committee	Complete 6 course credits in Minor Area	
			Complete 9 course credits in Thesis Hours	
Final Semester			Complete 3 course credits in Mathematics	
	Semester before Thesis Presentation /Graduation			Request for Approval of Thesis Reading Committee
				Request for Approval of Thesis Topic
				Apply to Graduate
Final Semester	At least 2 weeks prior to thesis presentation	Complete Format Check of Thesis (optional)		Submit Thesis Presentation Announcement
		Present Thesis		Complete Certificate of Thesis Approval and Evaluation Forms
	By semester deadline for thesis submission	Submit Thesis		SmarTech Repository Agreement Form
				Equipment Checkout Clearance Form
				Enrollment Waiver Form (only if needed)
				Request for Withholding of Thesis/Dissertation (optional)

### 2.10.1 Thesis MSME Degree

Below is a checklist of actions needed for the ME Thesis Master's degree. You are responsible to complete all necessary forms, which must be submitted and approved by the stated deadlines. (All forms to be submitted to the Office of Student Services- MRDC 3112)

Further information about all of these items can be found in the Woodruff School Graduate Handbook. For any questions or clarification regarding this checklist, please visit the Woodruff School Office of Student Services- MRDC 3112

	Requirement	Category	Deadline
<input type="checkbox"/>	1 <a href="#">Identify a Faculty advisor</a>	Thesis	On or before arrival
<input type="checkbox"/>	2 <a href="#">Submit a Master's Program of Study</a>	Forms	Within first semester
<input type="checkbox"/>	3 <a href="#">Complete 12 course credits in Major Area</a>	Course work	By graduation
<input type="checkbox"/>	4 <a href="#">Complete 6 course credits in Minor Area</a>	Course work	By graduation
<input type="checkbox"/>	5 <a href="#">Complete 9 course credits of Thesis Hours</a>	Course work	By graduation
<input type="checkbox"/>	6 <a href="#">Complete 3 course credits in Mathematics</a>	Course work	By graduation
<input type="checkbox"/>	7 <a href="#">Identify a Thesis Topic and your Thesis Reading Committee</a>	Thesis	During semester prior to Thesis Presentation
<input type="checkbox"/>	8 <a href="#">Apply to Graduate</a>	Forms	One semester before your expected graduating semester
<input type="checkbox"/>	9 <a href="#">Request for Approval of Master's Thesis Topic</a>	Forms	Semester before you are ready to present your thesis
<input type="checkbox"/>	10 <a href="#">Approval of your Topic and Reading Committee</a>	Forms	Semester before you are ready to present your thesis
<input type="checkbox"/>	11 <a href="#">Submit Thesis Presentation Announcement</a>	Forms	At least two weeks (14 days) prior to the thesis presentation

<input type="checkbox"/>	12	<a href="#">Complete Certificate of Thesis Approval and Evaluation Forms</a>	Forms	Prepare and bring to thesis presentation for committee signatures
<input type="checkbox"/>	13	<a href="#">Complete Format Check of Thesis (optional)</a>	Thesis	1 week before submission of your thesis
<input type="checkbox"/>	14	<a href="#">Submit Master's Thesis</a>	Thesis	By semester deadline for thesis submission
<input type="checkbox"/>	15	<a href="#">Request for Withholding of Thesis/Dissertation (optional)</a>	Forms	By semester deadline for thesis submission
<input type="checkbox"/>	16	<a href="#">Complete all documents prior to graduation</a>	Forms	By semester deadline for thesis submission
<input type="checkbox"/>	17	<a href="#">SmarTech Repository Agreement Form</a>	Forms	By semester deadline for thesis submission
<input type="checkbox"/>	18	<a href="#">Enrollment Waiver Form (only if needed)</a>	Forms	Before the last day of registration for the graduation term
<input type="checkbox"/>	19	<a href="#">Equipment Checkout Clearance Form</a>	Forms	A week before you graduate

### Detailed Instructions

#### 1 Identify a Faculty Advisor

Before your first semester, find a faculty advisor. Students can review available faculty by research area here: <http://www.me.gatech.edu/faculty>. Hiring will depend on the availability of funding in a faculty advisor's group, along with fit and student performance during interviews with potential faculty advisors.

[http://www.me.gatech.edu/graduate/handbook/ms/faculty\\_advisor](http://www.me.gatech.edu/graduate/handbook/ms/faculty_advisor)

#### 2 Submit a Master's Program of Study

A Ph.D. Program of Study form must be submitted for approval by your faculty advisor and the Woodruff School Graduate Committee before the end of your first semester of doctoral study.

This form should be resubmitted if/whenever your Program of Study changes.

<https://www2.me.gatech.edu/graddb/forms/student/>

Frequency and timing of Woodruff School graduate courses can be found here: <http://www.me.gatech.edu/hb/apA> and here: <http://www.me.gatech.edu/hb/apB>

Sample Programs of Study can be found here:

<http://www.me.gatech.edu/hb/apF>

### **3 Complete 12 course credits in Major Area**

The major area must be in a coherent subject area appropriate to ME, or related combinations. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement (a copy of the M.S. thesis abstract must be attached to the Ph.D. program of study form). ME 6753, ME 6789, and ME 6799 do not meet this requirement.

At least 9 credits (within the major or minor) must be ME xxxx credits. ME xxxx credits do not include thesis credits (ME 7000). At least 15 credits (within the major or minor) must be at 6000-level or above. Special Problem course credits (ME 89xx) may not be counted toward the M.S.M.E. Thesis course credits. The items listed below cannot be used to meet the course requirements for the M.S.M.E. degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a nonletter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- ME 7785
- CETL course work
- Professional Master's Degree course work

### **4 Complete 6 course credits in Minor Area**

The coherent minor area must be distinctly different from the major area. Note that ME 6753, ME 6789, and ME 6799 may only be used to satisfy the course work in the coherent minor area. COA 8685-Building Simulation Seminar, COA 8833-Computational Simulation of Build Design, MGT 6165, and BC 6650 may be included in the coherent minor area.

ME 6753 and BC 6650 may not be counted together in the coherent minor area. Any courses within the College of Engineering, College

of Science, or College of Computing can be counted toward the minor area.

At least 9 credits (within the major or minor) must be ME xxxx credits. ME xxxx credits do not include thesis credits (ME 7000). At least 15 credits (within the major or minor) must be at 6000-level or above. Special Problem course credits (ME 89xx) may not be counted toward the M.S.M.E. Thesis course credits. The items listed below cannot be used to meet the course requirements for the M.S.M.E. degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a nonletter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- ME 7785
- CETL course work
- Professional Master's Degree course work

**5 Complete 9 course credits of Thesis Hours**

At least 9 credit hours of ME 7000, or thesis credit hours, must be completed under your thesis advisor.

**6 Complete 3 course credits in Mathematics**

Only courses from the School of Mathematics fulfill the mathematics requirement (3 credits).

**7 Identify a Thesis Topic and your Thesis Reading Committee**

Semester before you are ready to present your thesis, a composition of your reading committee should be decided in conjunction with your advisor. The committee consists of at least three members.

<http://me.gatech.edu/graduate/handbook/ms/thesis-process>

**8 Apply to Graduate**

Apply online for graduation one (1) semester before your expected graduating semester.

[http://me.gatech.edu/graduate/apply\\_graduate](http://me.gatech.edu/graduate/apply_graduate)

**9 Request for Approval of Master's Thesis Topic**

Semester before you are ready to present your thesis, fill out the "Request for Approval of Master's Thesis Topics" form:

[http://www.grad.gatech.edu/sites/default/files/documents/masters\\_thstopicform\\_aug27.pdf](http://www.grad.gatech.edu/sites/default/files/documents/masters_thstopicform_aug27.pdf). Obtain the signature of only your thesis advisor and hand it in.



In addition, your thesis advisor should email a justification of the composition of your reading committee to Dr. Andrei Fedorov ([AGF@gatech.edu](mailto:AGF@gatech.edu)) and your academic advisor.

**10 Approval of your Topic and Reading Committee**

Once your topic and reading committee are approved, you will receive an email to pick up your “Request for Approval of master’s Thesis Topics” form. Please obtain the signature of the remaining committee members and hand it back to the Office of Student Services for processing.

**11 Submit Thesis Presentation Announcement**

Submit your announcement online two weeks (14 days) prior to the presentation. This action must be coordinated with your committee members:

<https://www2.me.gatech.edu/graddb/forms/student/>

A copy of the completed draft of the thesis should be emailed to your reading committee at the same time.

**12 Complete certificate of Thesis Approval and Evaluation Forms**

Before your presentation, complete the Certificate of Thesis Approval form:

<http://www.grad.gatech.edu/sites/default/files/documents/certifims.pdf>, bring it along with 3 copies of the Evaluation forms: <http://me.gatech.edu/files/grad/EvaluationForm> for your reading committee to sign as acceptance of your presentation/thesis. Bring all forms to the Office of Student Services for signature of Chair and processing.

**13 Complete Format Check of Thesis (optional)**

One week before submission of your thesis: Email a PDF of your thesis to [thesis@grad.gatech.edu](mailto:thesis@grad.gatech.edu) to have the format checked.

**14 Submit Master’s Thesis**

Submit your thesis electronically on the Graduate Studies website: (Only final copies of documents should be submitted to the electronic thesis and dissertations website.)

<http://www.grad.gatech.edu/theses-dissertations-electronic-submission>

**15 Request for Withholding of Thesis/Dissertation (optional)**

If your thesis advisor wishes to withhold your thesis, please complete and hand in to the Graduate Studies Office (318 SAVANT Building):

<http://www.grad.gatech.edu/sites/default/files/documents/withholdingform.pdf>

- 16 Complete all documents/forms prior to graduation**  
Make sure that all documents are completed before graduation deadline:  
<http://www.grad.gatech.edu/sites/default/files/documents/checklist-documents20121.pdf>
- 17 SmarTech Repository Agreement Form**  
Please complete and hand in to the Graduate Studies Office (318 SAVANT Building):  
<http://www.grad.gatech.edu/sites/default/files/documents/smartec hrepository.pdf>
- 18 Enrollment Waiver Form (only if needed)**  
Students who have met all requirements for graduation before the last day of registration for the graduation term and who were registered the preceding semester may be eligible for an Enrollment Waiver. The Enrollment Waiver must be submitted before the first day of classes.
- Enrollment Waiver form:  
[http://registrar.gatech.edu/docs/pdf/Enrollment\\_Waiver\\_form.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment_Waiver_form.pdf)
- Deadline for Enrollment Waiver:  
<http://www.grad.gatech.edu/theses-dissertations-deadlines>
- 19 Equipment Checkout Clearance Form**  
A week before you graduate, please complete and hand in the Equipment Checkout Clearance Form (form can be found under the “Forms” tab):  
<http://me.gatech.edu/graduate/handbook/forms>

## 2.10.2 Coursework MSME Degree

### GWW Woodruff School Checklist for MSME Coursework Program Georgia Institute of Technology

<b>TIMING</b>	<b>COURSEWORK</b>	<b>FORMS</b>
<b>Upon Arrival</b>		Submit a Program of Study
<b>Before Graduation</b>	<div>Complete 21 course credits in Major Area</div> <div>Complete 6 course credits in Minor Area</div> <div>Complete 3 course credits in Mathematics</div>	
<b>Semester before graduating semester</b>		Apply to Graduate
<b>By semester deadline of final semester</b>		Equipment Checkout Clearance Form

Below is a checklist of actions needed for the ME Coursework Master's degree. You are responsible to complete all necessary forms, which must be submitted and approved by the stated deadlines. (All forms to be submitted to the Office of Student Services- MRDC 3112)

Further information about all of these items can be found in the Woodruff School Graduate Handbook. For any questions or clarification regarding this checklist, please visit the Woodruff School Office of Student Services - MRDC 3112

	Requirement	Category	Deadline
<input type="checkbox"/>	1 <a href="#">Submit a Master's Program of Study</a>	Forms	Within first semester
<input type="checkbox"/>	2 <a href="#">Complete 21 course credits in Major Area</a>	Course work	By graduation
<input type="checkbox"/>	3 <a href="#">Complete 6 course credits in Minor Area</a>	Course work	By graduation
<input type="checkbox"/>	4 <a href="#">Complete 3 course credits in Mathematics</a>	Course work	By graduation
<input type="checkbox"/>	5 <a href="#">Apply to Graduate</a>	Forms	One semester before your expected graduating semester
<input type="checkbox"/>	6 <a href="#">Equipment Checkout Clearance Form</a>	Forms	A week before you graduate

### Detailed Instructions

#### 1 **Submit a Master's Program of Study**

A Ph.D. Program of Study form must be submitted for approval by your faculty advisor and the Woodruff School Graduate Committee before the end of your first semester of doctoral study.

This form should be resubmitted if/whenever your Program of Study changes.

<https://www2.me.gatech.edu/graddb/forms/student/>

Frequency and timing of Woodruff School graduate courses can be found here: <http://www.me.gatech.edu/hb/apA> and here:

<http://www.me.gatech.edu/hb/apB>

Sample Programs of Study can be found here:

<http://www.me.gatech.edu/hb/apF>

#### 2 **Complete 21 course credits in Major Area**

The major area must be in a coherent subject area appropriate to ME, or related combinations. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement (a copy of the M.S. thesis abstract must be attached to the Ph.D. program of study form). ME 6753, ME 6789, and ME 6799 do not meet this requirement.

At least 18 credits (within the major or minor) must be ME xxxx credits. ME xxxx credits do not include thesis credits (ME 7000). At least 24 credits (within the major or minor) must be at 6000-level or above. Up to 3 Special Problem course credits (ME 89xx) may be counted toward the M.E. Coursework Masters course credits. The items listed below cannot be used to meet the course requirements for the M.S.M.E. Coursework degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a nonletter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- ME 7785
- CETL course work
- Professional Master's Degree course work

### **3 Complete 6 course credits in Minor Area**

The coherent minor area must be distinctly different from the major area. Note that ME 6753, ME 6789, and ME 6799 may only be used to satisfy the course work in the coherent minor area. COA 8685-Building Simulation Seminar, COA 8833-Computational Simulation of Build Design, MGT 6165, and BC 6650 may be included in the coherent minor area.

ME 6753 and BC 6650 may not be counted together in the coherent minor area. Any courses within the College of Engineering, College of Science, or College of Computing can be counted toward the minor area.

At least 9 credits (within the major or minor) must be ME xxxx credits. ME xxxx credits do not include thesis credits (ME 7000). At least 15 credits (within the major or minor) must be at 6000-level or above. Special Problem course credits (ME 89xx) may not be counted toward the M.S.M.E. Thesis course credits. The items listed below cannot be used to meet the course requirements for the M.S.M.E. degree:

- Any course in which you do not receive a grade of C or higher
- Any course taken for a nonletter grade (except thesis, transfer credit, or advanced standing)
- Any course required for the B.S.M.E. degree
- ME 7785
- CETL course work
- Professional Master's Degree course work

- 4 Complete 3 course credits in Mathematics**  
Only courses from the School of Mathematics fulfill the mathematics requirement (3 credits).
- 5 Apply to Graduate**  
Apply online for graduation one (1) semester before your expected graduating semester.  
[http://me.gatech.edu/graduate/apply\\_graduate](http://me.gatech.edu/graduate/apply_graduate)
- 6 Equipment Checkout Clearance Form**  
A week before you graduate, please complete and hand in the Equipment Checkout Clearance Form (form can be found under the “Forms” tab):  
<http://me.gatech.edu/graduate/handbook/forms>

## **2.11 How to Find/Change a Faculty Advisor**

### **2.11.1 How to Find a Faculty Advisor**

All new GRA's and GTA's must participate in the thesis advisor selection process during the first month of their first semester in the Woodruff School.

The process for assigning new, undesignated GRA's to research projects and advisors accommodates both student and faculty desires to the maximum extent possible. You are expected to interview at least three faculty members. By the deadline, submit your top three projects or advisor choices to the Associate Chair for Graduate Studies on the Faculty Advisor Interview form. Similar feedback is obtained from each faculty member.

The Chair of the Woodruff School and the Associate Chair for Graduate Studies make the final GRA/GTA project-advisor assignments based on:

- Student preference
- Faculty preference
- Project priority (externally-funded projects have the highest priority)
- Current distribution of graduate students among advisors

### **2.11.2 Changing Your Faculty Advisor**

If you wish to change your advisor, you must first discuss the matter with your current advisor and satisfactorily complete all your graduate research assistant and research obligations and find a new faculty advisor.

To initiate your Change of Advisor request, please go to:  
<https://www2.me.gatech.edu/graddb/forms/student/>

Fill out the form and submit. Your current advisor will automatically be sent an email to approve this request and "release" you. Your new advisor will then automatically be sent an email to approve this request and "accept" you. The request will then be automatically routed to the Office of Student Services. Upon the Office of Student Services approval, your file will be officially updated.

## **2.12 Writing Your Master's Thesis**

The purpose of the master's thesis is to further your educational development by requiring you to plan, conduct, and report an organized and systematic study of importance. In keeping with the Woodruff School's policy of educating both practicing and research engineers, a thesis might range from a design project to a fundamental research investigation. Although you may propose a thesis topic and seek an advisor, the usual procedure is for you to work on a problem suggested by a faculty member. If you are employed on a sponsored research project, the thesis will usually be derived from this work.

### **2.12.1 Suggested Content of the Thesis**

A master's thesis should present information in four steps:

1. Describe a problem or question
2. Motivate the problem or question
3. Provide a solution to that problem or an answer to the question
4. Discuss or validate the solution or answer.

The first two of these steps provide introductory information that generally fills one or two chapters of the final document. The information provided in the third and fourth steps is governed by the scope of the project and by the kind of documentation that is deemed appropriate to the project. An experimental project, for example, is likely to require different kinds of evidence than might a redesign project. Such differences in the standards for evidence will directly impact the length of the final thesis, and they will impact the kinds of illustrations that are selected for inclusion in the final document.

Next is a list of the most common format headings for a master's thesis. Under each heading, we list the kinds of information typically presented under that heading. These information listings are necessarily schematic. Since thesis documents will vary according to project scope and evidentiary standards, you should view the listings as a point of departure from which to begin your own work.

### Abstract

On one sheet of paper, list the problem(s) addressed by the project and the solutions that are reported in the thesis.

### Introduction

Describe the need or question that is addressed in the project. Also, explain the benefits of addressing the need or answering the question, and explain briefly what solution you have developed.

### Background

Describe the background of the need or question, addressing some combination of the following:

- A review of published literature
- A survey of existing products or patents
- A survey of industrial efforts to address the problem or need

### Methods

Explain your strategy for addressing the problem, including theory and comparative benchmarks, as required. Describe the specific steps you have taken to address the problem, such as experimentation, computer modeling or simulation, and design and evaluation.

### Results and Discussion

Present, explain, and evaluate the results obtained on each component of the project.

### Closing

Summarize your conclusions and outline the questions raised or left open by your project.

## **2.13 The M.S. Thesis Process and Presentation**

### **2.13.1 M.S. Thesis Process**

Step 1. Identify an advisor, a thesis topic, and your thesis reading committee

- A. You are encouraged to talk to various faculty members regarding possible thesis topics and to begin this process immediately upon embarking on a degree program. Composition of your reading committee should be decided in conjunction with your advisor.
- B. The committee consists of at least three members. The advisor or one of the co-advisors must be a tenure-track (academic) Woodruff School faculty member, or a Woodruff School research faculty member with an earned doctorate. Two members of the M.S. Thesis Reading Committee must be tenure-track (academic faculty with primary or joint



appointments in the Woodruff School). All committee members must have an earned doctorate or equivalent professional experience.

- Step 2. Submit the Request for Approval of Master's Thesis Topic Form
- A. Fill out the Request for Approval of Master's Thesis Topic form ([http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform\\_aug27.pdf](http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform_aug27.pdf)) with only your signature and that of your advisor in time for a Woodruff School Graduate Committee meeting. No other signatures are needed at this time. Bring the form to the Office of Student Services for processing.
  - B. At the same time, your faculty advisor must email a short justification for the composition of your reading committee to Dr. Andrei Fedorov AGF@gatech.edu and cc your Academic Advisor. This step should be completed as early as possible, but not later than the submission of the petition for degree. Please Note: If a proposed member is not a Georgia Tech faculty member, a CV of that proposed member must also accompany the request. The advisor must also inform the Woodruff School Graduate Committee in the event the thesis contains any proprietary information that will require a delay in placing the thesis in the library.
- Step 3. Receive approval from the Woodruff School Graduate Committee and then obtain signatures of remaining committee members
- A. After the Woodruff School Graduate Committee approves your master's thesis reading committee and your Request for Approval of Master's Thesis Topic, you will receive an email from the Office of Student Services.
  - B. Please pick up your original copy of the Request for Approval of Master's Thesis Topic form from the Office of Student Services. Obtain the signatures of the other members of your reading committee. Bring the completed form to the Office of Student Services for the signature of the Associate Chair for Graduate Studies and additional processing.

#### Change in Thesis Title or Abstract

If there are any changes in your Thesis Title or Abstract, please complete an updated Request for Approval of Master's Thesis Topic form, found here:

[http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform\\_aug27.pdf](http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform_aug27.pdf)

Indicate on the form that this is only a change in title, abstract, or both. You and your advisor must sign the form and submit it to the Office of Student Services for processing. Changes to a master's thesis title or abstract are handled administratively and need not go to the Woodruff School Graduate Committee for approval.

#### Change in Thesis Reading Committee

If there are any changes to your Master's Thesis Reading Committee, it must be submitted to the Office of Student Services on an updated Request for Approval of Master's Thesis Topic. Your faculty advisor must e-mail a short justification for the change in Reading Committee to the Associate Chair for Graduate Studies, Dr. Andrei Fedorov AGF@gatech.edu. Upon approval by the Woodruff School Graduate Committee, the Request for Approval of Master's Thesis Topic form will be returned to you, so that you can secure the signatures of the new reading committee members. Return the completed form to the Office of Student Services. The form can be found here: [http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform\\_aug27.pdf](http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform_aug27.pdf)

#### 2.13.2 M.S. Thesis Presentation

Step 1. Provide the completed written thesis to your committee members

- A. Master's students who are preparing a thesis must give an oral presentation of their work. This presentation is not a formal defense. Rather, approval of the thesis is based upon the written document. The presentation may be scheduled only after the members of your M.S. Thesis Reading Committee have reviewed the completed written document and consider the thesis to be satisfactory. A copy of the completed final draft of the thesis must be in the hands of your reading committee before you are allowed to continue with scheduling the oral presentation.

Step 2. Schedule the M.S. Thesis Oral Presentation and submit the Thesis Presentation Announcement to the Office of Student Services

- A. Poll the members of your reading committee to establish a date and time for the presentation. Reserve a room for your oral presentation. Submit your announcement at the following link: <https://www2.me.gatech.edu/graddb/forms/student/>. This step must be completed at least two weeks (14 days) before the presentation. The announcement will be posted to the Woodruff School calendar.

Step 3. Submit the Certificate of Thesis Approval

- A. Before your presentation, complete a Certificate of Thesis Approval form and bring it to your M.S. Thesis Reading Committee members for them to sign the form to show their acceptance of your thesis.  
<http://www.grad.gatech.edu/sites/default/files/documents/certifims.pdf>
- B. Also download the Thesis/Proposal/Dissertation Assessment form and bring it to your presentation. Each committee member must fill out and sign the form at the conclusion of your presentation and give the form to the committee chair, who will seal them in an envelope and sign across the flap.  
<http://me.gatech.edu/files/grad/EvaluationForm>
- C. Both of the above forms must be handed in to the Office of Student Services.

IMPORTANT NOTICE:

You must be registered during the semester in which the final presentation occurs, unless an Enrollment Waiver ([http://registrar.gatech.edu/docs/pdf/Enrollment Waiver for m.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment%20Waiver%20for%20m.pdf)) is requested and approved.

## 2.14 Submitting Your Thesis

### 2.14.1 Format Check

You are urged to have your thesis format checked before making the final copies for your committee. To make an appointment to have the format of your thesis checked, please call the Graduate Thesis Office (Savant Building, Room 318) at 404-894-3092, or e-mail [thesis@grad.gatech.edu](mailto:thesis@grad.gatech.edu).

There are deadlines for the initial format check that is one week before the final submission deadline. There is a recommended deadline, but initial format checks will not be done in the week leading up to the thesis deadline; only final submissions will be checked that week. The specific requirements for the format, publication, and distribution of the thesis are explained here: <http://gradadmiss.gatech.edu/theses-dissertations>

### 2.14.2 Electronic Submission of Theses and Dissertations

Paper copies should be given to your advisor and the members of your reading committee, unless the members request a different format.

Please submit your theses electronically to the Graduate Studies office: <http://www.grad.gatech.edu/theses-dissertations-electronic-submission>

Enter the requested information about yourself and your thesis/dissertation and upload your thesis or dissertation in PDF format. Once you submit the documents electronically, an e-mail notice will be sent to your committee members.

The Thesis Approval Page will be the second page in your thesis/dissertation, but it will not show any signatures. List the committee members who approved your thesis or dissertation, but remove the signature lines and be certain you type in the date, which is the date that the final draft of your thesis/dissertation was approved.

The Graduate Office will check your electronic document and let you know about any corrections you must make. Make the corrections and resubmit the corrected file. If the Graduate Office has all the related documents, your thesis/dissertation will be approved and they will notify the Registrar's Office that you are eligible to graduate. Once you have graduated, your thesis/dissertation will be released for electronic circulation.

## **2.15 Deadlines**

The Georgia Tech Graduate Office establishes deadlines for the submission of theses. These deadlines are strictly enforced and failure to meet all the deadlines might jeopardize your graduation plans.

<http://www.gradadmiss.gatech.edu/thesis/thesisdeadlines.php>

### 3. Ph.D. Degree

The Doctor of Philosophy (Ph.D.) degree recognizes proficiency and high achievement in research. The items below are mandatory for all Ph.D. students.

#### 3.1 Course Requirements

##### 3.1.1 Mechanical Engineering

The doctoral degree in Mechanical Engineering requires 42 semester hours of coursework (on a letter-grade basis) beyond the bachelor's degree or its equivalent. Course grades must be C or higher to satisfy PhD degree requirements. Also, CETL classes **do not** meet these respective course requirements

Major Area	24	Must be in a coherent subject area appropriate to ME, or related combinations. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement (a copy of the M.S. thesis abstract must be attached to the Ph.D. program of study form). ME 6753, ME 6789, and ME 6799 do not meet this requirement
Minor Area	12	Must be distinctly different from the major area. The minor is intended to provide depth in an area not directly needed for Ph.D. research or related to the area of the principal expertise of the student.
Electives/Other	6	May be different than the major or minor, or could be applied to either the major or minor area
<b>Total</b>	<b>42</b>	

##### 3.1.2 Nuclear Engineering

The doctoral degree in Nuclear Engineering (NE) requires 42 semester hours of coursework (on a letter-grade basis) beyond the bachelor's degree or its equivalent. The doctoral degree in NE also allows for a specialization in Nuclear Enterprise Management. Course grades must be C or higher to satisfy PhD degree requirements. Also, CETL classes do not meet these respective course requirements.

Major Area	24	Must be in a coherent subject area appropriate to NE/RE. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement.
Minor Area	9	Must be distinctly different from the major area. The minor is intended to provide depth in an area

		not directly needed for Ph.D. research or related to the principal area of expertise
Electives	9	No restrictions
<b>Total</b>	<b>42</b>	

### 3.1.3 Nuclear Engineering with Nuclear Enterprise Management specialization

Major Area	21	Must be in a coherent subject area appropriate to NE/RE. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement.
Minor Area	9	Must be distinctly different from the major area. The minor is intended to provide depth in an area not directly needed for Ph.D. research or related to the principal area of expertise
Electives	9	No restrictions
Other	3	NRE 8803 - Management of the Nuclear Enterprise
<b>Total</b>	<b>42</b>	

### 3.1.4 Medical Physics Option in Nuclear Engineering

Required coursework for the Medical Physics option of the NE degree is 52 hours beyond the bachelor's degree or its equivalent. A total of 36 semester hours must be at the 6000 level or above. Up to six semester hours may be at the 4000 level. Any courses required for the B.S.M.E. or the B.S.N.R.E do not meet these respective course requirements. Course grades must be C or higher to satisfy PhD degree requirements. Also, CETL classes do not meet these respective course requirements.

Major Area	34	Must be in a coherent subject area appropriate to MP. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement.
Minor Area	9	Must be distinctly different from the major area. The minor is intended to provide depth in an area not directly needed for Ph.D. research or related to the principal area of expertise
Electives/Other	9	May be different than the major or minor, or could be applied to the major or minor area.
<b>Total</b>	<b>52</b>	

### 3.1.5 Robotics

The objective of the Robotics Ph.D. Program is to educate a new breed of multidisciplinary researchers in the area of robotics. This supports the expressed mission of Georgia Tech to provide education in "technology and technologically-related disciplines and interdisciplinary areas" and to recruit and educate outstanding students who will provide "leadership in a world that is increasingly dependent on technology." The program includes coursework and a strong multidisciplinary research component.

Introduction to Robotics Research	3	CS/AE/ECE/ME 7785
Foundation Courses	9	Three foundation courses, each selected from distinct core areas: Mechanics, Controls, Perception, Artificial Intelligence, and Autonomy.
Targeted Electives	9	Three targeted elective courses, each selected from the same three core areas used for the foundation courses.
Multidisciplinary Robotics Research I and II	6	CS/AE/ECE/ME 8750 and CS/AE/ECE/ME 8751
Minor Area	9	Three courses outside the major area to provide a coherent minor in accordance with Institute policies
<b>Total</b>	<b>36</b>	

\*A maximum of two classes (6 semester hours) at the 4000 level may be used to satisfy the 36 semester hour requirement.

### 3.1.6 Paper Science and Engineering

The doctoral degree in Paper Science and Engineering requires 42 semester hours of course work (on a letter-grade basis) beyond the bachelor's degree or its equivalent. Course grades must be C or higher to satisfy PhD degree requirements. Also, CETL classes do not meet these respective course requirements. You are expected to be well grounded in the fundamentals of Paper Science and Engineering and have successfully completed the minimum coursework requirements for the master's degree in Paper Science and Engineering. You must demonstrate a mastery of some body of knowledge outside the core discipline of Paper Science and Engineering. This is referred to as a minor program of study. The minor should consist of at least nine semester hours of cohesive courses chosen in consultation with the thesis advisor. The courses must be at the 6000

level or above. You must complete the minor program with a grade point average of 3.3 or better.

Major Area	24	Must be in the subject area of paper science and engineering. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement (a copy of the M.S. thesis abstract must be attached to the Ph.D. program of study form).
Minor Area	9	Must be distinctly different from the major area. The minor is intended to provide depth in an area not directly needed for Ph.D. research or related to the area of the principal expertise of the student.
Electives	9	Six of these credits need to be courses in paper science and engineering.
<b>Total</b>	<b>42</b>	

### 3.1.7 Bioengineering

Engineering Fundamentals	9	
Biological Sciences	9	3 hours must be from the approved list
Engineering Math	3	From approved list or approval
Bioengineering and Tech Elective	12	
<b>Total</b>	<b>33</b>	

For more information about the Bioengineering PhD Program, please visit:  
<http://bioengineering.gatech.edu/>

## 3.2 Guidelines for Registration

### 3.2.1 Courses

A list of the courses by number and their frequency of offering may be found in Appendix A.



A list of the courses in each of the research areas in the Woodruff School may be found in Appendix B.

A list of distance-learning course projections may be found in Appendix C.

For the listing of all classes to be offered each semester and complete registration information, see the On-Line Student Computer Assisted Registration (OSCAR). OSCAR also has instructions, class schedules, and academic calendar information: <https://oscar.gatech.edu>.

### 3.2.2 Registration

To register for courses, please login to OSCAR.

For part-time students, the minimum load is three credit hours.

Full-time enrollment is required of all students receiving financial aid and for international students on visas. You must register for a minimum of twelve hours of letter-grade and/or pass/fail thesis or dissertation credit hours to maintain your status as a full-time student. Failure to register on time might delay the payment of a fellowship stipend or tuition payment.

Research assistants doing thesis research must sign up for thesis hours (ME/NRE/MP 7000 for the MS and ME/NRE 9000 for the Ph.D.). Graduate research assistants conducting research should register for letter-grade course work (usually six to nine hours) and sufficient thesis hours to bring the total load to 21 credit hours. Teaching assistants may add three audit hours in recognition of the teaching assignment (ME/NRE 8997). The Institute Policy on Hour Loads for Graduate Students is found at:

[www.gradadmiss.gatech.edu/thesis/policies/hr\\_load\\_grad.pdf](http://www.gradadmiss.gatech.edu/thesis/policies/hr_load_grad.pdf)

For more registration information, please go to:

<http://me.gatech.edu/graduate/registration>

### 3.2.3 Enrollment Reduction or Enrollment Waiver

Students must be registered for a minimum of three credit hours at all times, except that thesis students may enroll for one hour of 7000/9000 in the semester of graduation. This Enrollment Reduction may be used only once.

Students who have met all requirements for graduation before the last day of registration for the graduation term and who were registered the preceding semester may be eligible for an Enrollment Waiver. The Enrollment Waiver must be submitted before the first day of classes. You must also reactivate your degree petition at the same time as you submit

the enrollment waiver. The waiver must be signed by your advisor and the Associate Chair for Graduate Studies.

Enrollment Waiver form:

[http://registrar.gatech.edu/docs/pdf/Enrollment\\_Waiver\\_form.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment_Waiver_form.pdf)

Deadline for Enrollment Waiver:

<http://www.grad.gatech.edu/theses-dissertations-deadlines>

### **3.3 Grades and Credit Hours**

As a master's degree student, you must maintain overall and semester grade point averages (GPA) of at least 3.0 to maintain good academic standing. In addition, the GPA for courses on your approved program of study must be 3.0 or higher. If your GPA drops below 3.0, you will be given two semesters in residence at Georgia Tech to raise your grade point average to good academic standing. Failure to do so will result in your being dropped from the program. You must earn a graduate grade point average of at least 3.0 or higher and satisfy all remaining requirements to be certified for the master's degree.

A new graduate student (unless currently enrolled as a Georgia Tech undergraduate) who participates in the Graduate Cooperative Program during his/her first semester of enrollment must register for one hour of ME 6798 (Cooperative Internship) in order to establish a record of enrollment. You must also pay the appropriate out-of-state or in-state tuition and fees.

If you complete both the bachelor's and master's degrees in the same discipline in the Woodruff School, you may use up to six credit hours of graduate-level course work in the major discipline for both degrees. To qualify for this option, you must complete the undergraduate degree with a cumulative GPA of 3.5 or higher and complete the master's degree within a two-year period from the award date of the bachelor's degree.

If you are pursuing dual master's degrees in Mechanical Engineering and Nuclear and Radiological Engineering (the M.S.M.E. and M.S.N.E.) you may double count the six hours of coursework used to fulfill the math/basic science minor requirement of both degrees.

In addition, the Woodruff School has a five-year BS/MS program for those undergraduate students who have a GPA of 3.5 or higher and wish to obtain a graduate degree. Final admission to the graduate program is contingent upon completion of the BSME degree at Georgia Tech with a GPA of 3.0 or higher. In addition, you must matriculate into the graduate program immediately (excluding summer semester) upon receipt of your B.S. degree. For details, about the BS/MS program: <http://me.gatech.edu/undergraduate/bsms>

### 3.4 Special Problem Courses

A special problem is an individual study in a specialized area under the direction of a member of the Woodruff School faculty. To register for ME/NRE/MP 89XX you must select a project and find a faculty member to direct it. The Special Problems Course form can be submitted online.

Each special problem must culminate in a written final report, which is to be submitted to the advisor for grading. All special problems are given a letter grade. Special Problem credits may not be included as part of the 30 hours of required coursework for master's thesis students.

The Special Problem Statement represents a contract between the student and the Woodruff School. Therefore, the tasks to be performed must be stated clearly and careful consideration should be given to the amount of course credit proposed for these tasks.

To initiate your Special Problem Course Form, please go to:

<https://www2.me.gatech.edu/graddb/forms/student/>

### 3.5 Petition to the Faculty

The Institute Graduate Committee is responsible for all Institute-wide academic policies and degree requirements at the graduate level. In addition, they make decisions regarding all Institute-level graduate student petitions. These petitions include late withdrawals, changes in graduate standing, grade disputes, readmissions, and deadlines. You are strongly encouraged to discuss a petition with your academic advisor and the Associate Chair for Graduate Studies before it is filed: <http://registrar.gatech.edu/students/formlanding/pettofac.php>

### 3.6 Apply to Graduate

Step 1. Due Dates for the On-Line Application for Graduation

1. New (first-time) On-line Applications for Graduation are due the semester BEFORE you plan to graduate. (Ex. if you are graduating in Spring 2017, your on-line degree application is due in Fall 2016.)
2. A different on-line application for graduation is due for every semester that you attempt to graduate. If you do not graduate when planned, you must fill out another On-line Application for Graduation. Every Application for Graduation made after the initial request is called an On-line Reapplication for Graduation.
3. Application deadlines are found on the registrar's calendar, here: <http://registrar.gatech.edu/calendar/>
4. Students submit a separate On-line Application to Graduate for every semester they attempt to graduate.

## Step 2. Verify Your Program of Study

1. All graduate students (MS and PhD) must submit a Program of Study, here: <https://www2.me.gatech.edu/graddb/forms/student/>
2. If you have made any changes to your Program of Study, you must submit a new one for approval to the ME department here: <https://www2.me.gatech.edu/graddb/forms/student/>
3. *BSMS Students Only* - Classes that were taken at the undergraduate level will not show up in degreeworks. They must be manually added by your graduate advisor.

## Step 3. Request to Graduate using the On-line Application for Graduation

1. Go to [www.buzzport.gatech.edu](http://www.buzzport.gatech.edu).
2. Select Registration - OSCAR.
3. Select Student Services & Financial Aid, then Student Records and then Apply to Graduate.
4. If you are asked to Select the Current Term, then select the *current semester (not the graduation semester)* in the drop down box. Press Continue.
5. You will now be on the *Curriculum Selection* screen. If your curriculum or minor are not correct, you must get that fixed immediately after applying to graduate.
  - Major: If your primary or secondary majors are not correct, then you must fill out a change of major form to correct it, found here: <http://www.registrar.gatech.edu/students/formlanding/changemajor.php>
6. Select the radio button for the program that you are graduating from. Press Continue. NOTE: Students who have two majors can only select one major at a time; you will need to complete this entire process for both majors.
7. On the next screen, select the graduation term in the drop down box. Press Continue.
8. On the *Diploma Name Selection* screen, select if you will be using your current name or a different name to appear on your diploma. Press Continue. NOTE: The registrar's office will review all requests to change names on the diploma.
9. The next screen will ask you to confirm your name. Press Continue.
10. On the *Diploma Mailing Address Selection* screen, select the address where you want to send your diploma. Press Continue. NOTE: Diplomas are mailed approximately 8 weeks after graduation so plan accordingly.
11. On the *Graduation Application Summary* screen, review all of your information carefully. When you are okay with the information on the screen click Submit Request.
12. On the next screen, click on the link at the bottom of the page. This will redirect you to Georgia Tech's Exit Survey. Fill out the survey.

Step 4. Verify that Your On-line Application for Graduation was Correctly Submitted

1. Go to [www.buzzport.gatech.edu](http://www.buzzport.gatech.edu).
2. Select Registration - OSCAR.
3. Select Student Services & Financial Aid, then Student Records and then View Application to Graduate.
4. If it asks you to select a semester, please select the semester that you planning to graduate.
5. If you correctly submitted the On-line Application to Graduate you will see it on that screen. If it says that No active graduation application exists then your application to graduate was not submitted.

Step 5. Track Your Graduation Status

1. Several times throughout your final semester you must verify the status of your application to graduate in OSCAR. From OSCAR, select Student Services & Financial Aid, then Student Records, and View Application to Graduate.
2. Go here for an explanation about the codes used in your graduation update: [http://me.gatech.edu/files/grad/degree\\_cert\\_codes.pdf](http://me.gatech.edu/files/grad/degree_cert_codes.pdf)
3. Two audits will be done for graduating students; the first audit will be done after phase 2 registration. The second audit will be done after final grades have posted.
4. After the first audit, students will have one month to fix any problems.

Any student who still has deficiencies after one month will automatically be inactivated (not graduating) and you will need to apply to graduate for the following semester. The only deficiencies which will not lead to an automatic inactivation are LOW GPA, PENDING TRANSFER CREDIT and REGISTRAR ADMINISTRATIVE DEFICIENCY.

### 3.7 Checklist for the Ph.D. Degree

#### G.W.Woodruff School Checklist for PhD Program Georgia Institute of Technology

TIMING	THESIS	SEMINARS	COURSEWORK	QUALIFYING EXAMS	TEACHING PRACTICUM	FORMS
Upon Arrival	Identify a Faculty Advisor					Submit a Program of Study
Following 1 year of enrollment for MS holders, Following 2 years of enrollment for BS holders				Pass Ph.D. Qualifying Exam		Request for Admission to Ph.D. Candidacy
Year 1			Complete 24 course credits in Major Area			Request for Approval of Doctoral Minor form
Year 2			Complete 12 course credits in Minor Area			Complete all documents/forms on checklist prior to graduation
Year 3			Complete 6 course credits in Electives		Complete Teaching Practicum	
Year 4+						
Within 1 Year of Passing Qualifying Exams	Identify a Proposal Topic Identify Proposal Reading Committee Present Proposal					Submit Proposal Presentation Announcement Submit Forms for Proposal Presentation
Semester before Final Semester		Complete Seminars (ME/NRE 8011 & 8012)				Submit list of seminars attended and "Seminar Registration" Form Apply to Graduate
Final Semester	Submit Dissertation Abstract and Cover Page Complete Format Check of Thesis (optional) Defend Dissertation Submit Dissertation					Submit Ph.D. Defense Announcement Complete Certificate of Thesis Approval for Doctoral Students, and Evaluation Forms SmarTech Repository Agreement Form Survey of Earned Doctorate Form (online) Equipment Checkout Clearance Form Enrollment Waiver Form (only if needed) Request for Withholding of Thesis/Dissertation (optional)

Below is a Checklist of actions needed for the Ph.D. degree. You are responsible to complete all necessary forms, which must be submitted and approved by the stated deadlines. (All forms to be submitted to the Office of Student Services-MRDC 3112)

Further information about all of these items can be found in this Graduate Handbook. For any questions or clarification regarding this checklist, please visit the Woodruff School Office of Student Services- MRDC 3112

	Requirement	Category	Deadline
<input type="checkbox"/>	1 <a href="#">Identify a Faculty advisor</a>	Thesis	On arrival
<input type="checkbox"/>	2 <a href="#">Submit a Program of Study</a>	Forms	Within first semester
<input type="checkbox"/>	3 <a href="#">Pass Ph.D. Qualifying Exam</a>	Qualifying Exams	Following 1 year of enrollment for MS holders, Following 2 years of enrollment for BS holders
<input type="checkbox"/>	4 <a href="#">Complete 24 course credits in Major Area</a>	Course work	By graduation
<input type="checkbox"/>	5 <a href="#">Complete 12 course credits in Minor Area</a>	Course work	By graduation
<input type="checkbox"/>	6 <a href="#">Complete 6 course credits in Electives</a>	Course work	By graduation
<input type="checkbox"/>	7 <a href="#">Complete Teaching Practicum</a>	Course work	Prior to last semester
<input type="checkbox"/>	8 <a href="#">Complete Seminars (ME/NRE 8011 &amp; 8012)</a>	Seminar	One semester before your expected graduating semester
<input type="checkbox"/>	9 <a href="#">Submit list of seminars attended and "Seminar Registration" Form</a>	Forms	One semester before your expected graduating semester
<input type="checkbox"/>	10 <a href="#">Identify a Proposal Topic and your Proposal Reading Committee</a>	Thesis	During semester prior to Proposal Presentation Proposal Presentation recommended within 1 year of passing qualifying exams
<input type="checkbox"/>	11 <a href="#">Request for Admission to Ph.D. Candidacy</a>	Forms	During semester prior to Proposal Presentation
<input type="checkbox"/>	12 <a href="#">Proposal Presentation Announcement</a>	Forms	Two weeks prior to Proposal Presentation
<input type="checkbox"/>	13 <a href="#">Submit Forms for Proposal Presentation</a>	Forms	Directly following Proposal Presentation
<input type="checkbox"/>	14 <a href="#">Apply to Graduate</a>	Forms	One semester before your expected graduating semester

<input type="checkbox"/>	15	<a href="#">Submit Ph.D. Defense Announcement</a>	Forms	At least six (6) months after your proposal presentation, AND At least two weeks (14 days) prior to the defense
<input type="checkbox"/>	16	<a href="#">Complete certificate of thesis Approval for doctoral Students, and Evaluation Forms</a>	Forms	Before thesis defense
<input type="checkbox"/>	17	<a href="#">Complete Format Check of Thesis (optional)</a>	Thesis	1 week before submission of your dissertation
<input type="checkbox"/>	18	<a href="#">Submit Dissertation</a>	Thesis	By semester deadline for dissertation submission
<input type="checkbox"/>	19	<a href="#">Submit Dissertation Abstract and Cover Page</a>	Thesis	By semester deadline for dissertation submission
<input type="checkbox"/>	20	<a href="#">Request for Withholding of Thesis/Dissertation (optional)</a>	Forms	By semester deadline for dissertation submission
<input type="checkbox"/>	21	<a href="#">Complete all documents prior to graduation</a>	Forms	By semester deadline for dissertation submission
<input type="checkbox"/>	22	<a href="#">Request for Approval of Doctoral Minor form</a>	Forms	By semester deadline for dissertation submission
<input type="checkbox"/>	23	<a href="#">SmarTech Repository Agreement Form</a>	Forms	By semester deadline for dissertation submission
<input type="checkbox"/>	24	<a href="#">Survey of Earned Doctorate Form (online)</a>	Forms	By semester deadline for dissertation submission
<input type="checkbox"/>	25	<a href="#">Enrollment Waiver Form (only if needed)</a>	Forms	Before the last day of registration for the graduation term
<input type="checkbox"/>	26	<a href="#">Equipment Checkout Clearance Form</a>	Forms	A week before you graduate



## Detailed Instructions

### 1 Identify a Faculty Advisor

Before your first semester, find a faculty advisor. Students can review available faculty by research area here: <http://www.me.gatech.edu/faculty>. Hiring will depend on the availability of funding in a faculty advisor's group, along with fit and student performance during interviews with potential faculty advisors.

### 2 Submit a Program of Study

A Ph.D. Program of Study form must be submitted for approval by your faculty advisor and the Woodruff School Graduate Committee before the end of your first semester of doctoral study.

This form should be resubmitted if/whenever your Program of Study changes.

<https://www2.me.gatech.edu/graddb/forms/student/>

Frequency and timing of Woodruff School graduate courses can be found in Appendix A and Appendix B of this Graduate Handbook.

Sample Programs of Study can be found here in Appendix F of this Graduate Handbook.

### 3 Pass Ph.D. Qualifying Exam

The objective of the Ph.D. Qualifying Examination is to assess your general knowledge of mechanical engineering or nuclear and radiological engineering. The examination philosophy of the Woodruff School is to evaluate your understanding of fundamental principles and your ability to apply these principles to solve problems. The English language in both its written and oral forms will be used to solve problems on the qualifying examination. The qualifying examination provides an early assessment of your potential to satisfactorily complete the requirements for the doctoral degree. All students entering the Ph.D. program in the Woodruff School are required to take the examination. The written examination is closed-book and closed-notes.

Entering with MS Degree: First opportunity following the one- year anniversary of enrollment. For example, if enrollment were Fall 2018, qualifying exams would be taken Fall 2019.

Entering with BS Degree: First opportunity following the two- year anniversary of enrollment. For example, if enrollment were Fall 2018, qualifying exams would be taken Fall 2020.

The dates of qualifying exams for each year are posted here, along with further information about the exams in Section 3.11 of this Graduate Handbook, or online here:

<http://www.me.gatech.edu/graduate/handbook/phd/quals>

Descriptions of exam topics can be found here in Appendix D of this Graduate Handbook.

Historic exams can be found here: <http://quals.me.gatech.edu>

**4 Complete 24 course credits in Major Area**

The major area must be in a coherent subject area appropriate to ME, or related combinations. If you completed a master's thesis in this area, it may count for nine semester hours toward this requirement (a copy of the M.S. thesis abstract must be attached to the Ph.D. program of study form). ME 6753, ME 6789, and ME 6799 do not meet this requirement.

**5 Complete 12 course credits in Minor Area**

The minor area must be distinctly different from the major area. The minor is intended to provide depth in an area not directly needed for Ph.D. research or related to the area of the principal expertise of the student. Any courses within the College of Engineering, College of Science, or College of Computing can be counted toward the minor area.

**6 Complete 6 course credits in Electives**

Elective courses may be different than the major or minor, or could be applied to either the major or minor area.

**7 Complete Teaching Practicum**

The teaching practicum must be completed prior to your last semester. Students enrolled in the teaching practicum will work closely with a Woodruff School faculty member in all aspects of teaching a course. The faculty member of record will maintain full responsibility for the course. You must do the teaching component and the classwork in the same term.

Students enrolled in the practicum will attend regular meetings to discuss aspects of teaching appropriate to your chosen field. You may **not** register for this course during the semester in which you expect to receive the Ph.D. ME/NRE 7757 is offered on a pass/fail basis and **cannot** be used to satisfy the 42 semester-hours course work requirement. Obtain the approval of both the proposed faculty mentor and your advisor, and submit the form online: <https://www2.me.gatech.edu/graddb/forms/student/>

**8 Complete Seminars (ME/NRE 8011 & 8012)**

All Ph.D. students must register for Seminar **8011** (1 credit hour- no letter grade- attend at least 11 seminars) and Seminar **8012** (1 credit hour- no letter grade- attend at least 11 seminars). You must keep track of each seminar that you attend (date, speaker, title of seminar).

Any graduate research seminar given in the Woodruff School may be used to satisfy this requirement provided that the seminar is not part of another course for which you are registered. The seminar schedule can be found here: <http://www.me.gatech.edu/aggregator/sources/2>

- 9 Submit list of seminars attended and “Seminar Registration” Form**  
After you attend **eleven** seminars, submit the online Seminar Registration Form during registration period. Once the approval process is completed, you will be issued a permit to register for seminar credit. Once you have this permission, you must formally register for the seminar course (ME/ NRE 8011 and/or ME/ NRE 8012).  
<https://www2.me.gatech.edu/graddb/forms/student/>
- 10 Identify a Proposal Topic and your Proposal Reading Committee**  
Prior to the semester that you are ready to present your Proposal, a composition of your reading committee should be decided in conjunction with your advisor. The committee consists of at least five members.  
<http://me.gatech.edu/graduate/handbook/phd/proposal>
- 11 Request for Admission to Ph.D. Candidacy**  
To be admitted for Ph.D. candidacy, a student must meet the following requirements:
- Thesis topic identified
  - Thesis committee chosen
  - Qualifying exams passed
  - Responsible Conduct of Research (RCR) training completed (online CITI RCR **AND** RCR Credit Course) (if required by your funding source)
- Prior to the semester that you are ready to present your Proposal, complete the “Request for Admission to Ph.D. Candidacy” form:  
<http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>. Obtain the signature of only your thesis advisor and hand it in.
- In addition, your thesis advisor should email a justification of the composition of your reading committee to Dr. Andrei Fedorov ([andrei.fedorov@me.gatech.edu](mailto:andrei.fedorov@me.gatech.edu)) and your academic advisor.
- 12 Proposal Presentation Announcement**  
Submit your announcement online two weeks (14 days) prior to the presentation. This action must be coordinated with your committee members:  
<https://www2.me.gatech.edu/graddb/forms/student/>
- A copy of the completed draft of the thesis should be emailed to your reading committee at the same time.
- 13 Submit Forms for Proposal Presentation**  
Before your presentation, pick up your “Request for Admission to Ph.D. Candidacy” form:  
<http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>

Bring it along with 5 copies of the Evaluation forms:

<http://me.gatech.edu/files/grad/EvaluationForm>

for your reading committee to sign as acceptance of your presentation/thesis.

Bring forms back to the Office of Student Services for signature of Chair and processing.

**14 Apply to Graduate**

Apply online for graduation one (1) semester before your expected graduating semester.

[http://me.gatech.edu/graduate/apply\\_graduate](http://me.gatech.edu/graduate/apply_graduate)

**15 Submit Ph.D. Defense Announcement**

Deadlines are posted each semester on the Graduate Studies website:

<http://www.grad.gatech.edu/theses-dissertations-deadlines>

Must be at least six (6) months after your Thesis Proposal presentation.

Submit your announcement online two weeks (14 days) prior to the presentation. This action must be coordinated with your committee members:

<https://www2.me.gatech.edu/graddb/forms/student/>

A copy of the completed draft of the thesis should be emailed to your reading committee at the same time.

**16 Complete certificate of thesis Approval for doctoral Students, and Evaluation Forms**

Before your presentation, complete the Certificate of Thesis Approval for Doctoral Students:

<http://www.grad.gatech.edu/sites/default/files/documents/certiphd.pdf>,

bring it along with the 5 copies of the Evaluation forms:

<http://me.gatech.edu/files/grad/EvaluationForm> for your reading committee to sign as acceptance of your presentation/defense.

Bring all forms to the Office of Student Services for signature of Chair and processing.

**17 Complete Format Check of Thesis (optional)**

One week before submission of your dissertation: Email a PDF of your dissertation to [thesis@grad.gatech.edu](mailto:thesis@grad.gatech.edu) to have the format checked.

**18 Submit Dissertation**

Submit your dissertation electronically on the Graduate Studies website:

<http://www.grad.gatech.edu/theses-dissertations-electronic-submission>

**19 Submit Dissertation Abstract and Cover Page**

Please bring 2 Copies of Abstract and 2 Copies of Cover Page to the Graduate Studies office (318 SAVANT Building) on or before the published deadlines.

- 20 Request for Withholding of Thesis/Dissertation (optional)**  
If your thesis advisor wishes to withhold your dissertation, please complete and hand in to the Graduate Studies Office (318 SAVANT Building):  
<http://www.grad.gatech.edu/sites/default/files/documents/withholdingform.pdf>
- 21 Complete all documents/forms prior to graduation**  
Make sure that all documents are completed before graduation deadline:  
<http://www.grad.gatech.edu/sites/default/files/documents/checklist-documents20121.pdf>
- 22 Request for Approval of Doctoral Minor form**  
Please complete and hand in:  
[http://www.grad.gatech.edu/sites/default/files/documents/doctoral\\_minor\\_form.pdf](http://www.grad.gatech.edu/sites/default/files/documents/doctoral_minor_form.pdf)
- 23 SmarTech Repository Agreement Form**  
Please complete and hand in to the Graduate Studies Office (318 SAVANT Building):  
<http://www.grad.gatech.edu/sites/default/files/documents/smartechrepository.pdf>
- 24 Survey of Earned Doctorate Form (online)**  
Please complete online, print “certificate of completion” and hand in to the Graduate Studies Office (318 SAVANT Building):  
<http://www.grad.gatech.edu/theses-dissertations-forms>
- 25 Enrollment Waiver Form (only if needed)**  
Students who have met all requirements for graduation before the last day of registration for the graduation term and who were registered the preceding semester may be eligible for an Enrollment Waiver. The Enrollment Waiver must be submitted before the first day of classes.  
  
Enrollment Waiver form:  
[http://registrar.gatech.edu/docs/pdf/Enrollment\\_Waiver\\_form.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment_Waiver_form.pdf)  
  
Deadline for Enrollment Waiver:  
<http://www.grad.gatech.edu/theses-dissertations-deadlines>
- 26 Equipment Checkout Clearance Form**  
A week before you graduate, please complete and hand in the Equipment Checkout Clearance Form (form can be found under the “Forms” tab):  
<http://me.gatech.edu/graduate/handbook/forms>

## **3.8 How to Find/Change a Faculty Advisor**

### **3.8.1 How to Find a Faculty Advisor**

All new GRA's and GTA's must participate in the thesis advisor selection process during the first month of their first semester in the Woodruff School.

The process for assigning new, undesignated GRA's to research projects and advisors accommodates both student and faculty desires to the maximum extent possible. You are expected to interview at least three faculty members. By the deadline, submit your top three projects or advisor choices to the Associate Chair for Graduate Studies on the Faculty Advisor Interview form. Similar feedback is obtained from each faculty member.

The Chair of the Woodruff School and the Associate Chair for Graduate Studies make the final GRA/GTA project-advisor assignments based on:

- Student preference
- Faculty preference
- Project priority (externally-funded projects have the highest priority)
- Current distribution of graduate students among advisors

### **3.8.2 Changing your Faculty Advisor**

If you wish to change your advisor, you must first discuss the matter with your current advisor and satisfactorily complete all your graduate research assistant and research obligations and find a new faculty advisor.

To initiate your Change of Advisor request, please go to:

<https://www2.me.gatech.edu/graddb/forms/student/>

Fill out the form and submit. Your current advisor will automatically be sent an email to approve this request and "release" you. Your new advisor will then automatically be sent an email to approve this request and "accept" you. The request will then be automatically routed to the Office of Student Services. Upon the Office of Student Services approval, your file will be officially updated.

## **3.9 Develop a Program of Study**

A Ph.D. Program of Study form must be submitted for approval by your faculty advisor and the Woodruff School Graduate Committee before the end of your first semester of doctoral study.

Upon preliminary approval, the Ph.D. Program of Study will be forwarded to the Woodruff School Graduate Committee for final approval. In preparing your

program of study, you should be aware that graduate courses are usually offered only once a year and in some cases even less frequently. Appendix B contains a listing of graduate courses and their frequency of offering.

Any deviation from your proposed program of study should be approved in advance of taking the new course work by submitting a revised program of study. These revisions may be submitted at any time, except the semester in which you are graduating. Revisions during the semester in which you are graduating must be made on or before the first day of classes. This will allow time for the review and approval process prior to the close of registration for classes.

To initiate your Ph.D. Program of Study submission, please go to the following link and follow the online instructions:

<https://www2.me.gatech.edu/graddb/forms/student/>

If you note any problems with this automated process, please notify the Office of Student Services at (404) 894-3204 or send an email to [computer.support@me.gatech.edu](mailto:computer.support@me.gatech.edu).

### 3.9.1 Transfer Credits

If you plan to include any course taken outside of Georgia Tech in your Program of Study, please follow these steps:

1. Bring an official copy of your transcript to your academic advisor at the Office of Student Services - MRDC, room 3112.
2. A copy of the course syllabus for each course.
3. A copy of your M.S. Thesis Abstract, if you are requesting course credit for your master's thesis.
4. All documents will be reviewed by the Woodruff School Graduate Committee (they meet once a month).
5. Your academic advisor will inform you if/ when your transfer credits are approved/denied.

### 3.9.2 FAQ: Program of Study

1. **Q.** When should I submit my Program of Study?  
**A.** *The Proposed Program of Study should be submitted electronically via the handbook:*  
*(<https://www2.me.gatech.edu/graddb/forms/student/>) by the end of the first term. It should be updated whenever changes are made.*
2. **Q.** Do you allow transfer credit from other schools?  
**A.** *Any transfer of credit must be requested during your first semester in residence at Georgia Tech. You may receive up to six semester hours of transfer credit toward the M.S. degree for graduate-level courses taken at an accredited institution in the United States or*

*Canada and not used for credit toward another degree. You must supply a current transcript of these courses for the evaluation.*

3. **Q.** I entered the Ph.D. program with an M.S. from another school. Can I use any of the M.S. classes toward the Ph.D. coursework requirement?

**A.** Yes, you may use any course work that you have earned beyond the BS degree. You may also use up to nine hours of credit from your thesis if you completed an MS thesis option.

4. **Q.** Can Pass/Fail courses be counted towards the degree requirement?

**A.** No, only letter grade courses are allowed.

### **3.10 The Ph.D. Qualifying Examination**

Dates for the upcoming exams for fall and spring semesters of the current are posted here: <http://me.gatech.edu/graduate/handbook/phd/quals>

#### **3.10.1 Objective**

The objective of the Ph.D. Qualifying Examination is to assess your general knowledge of mechanical engineering or nuclear and radiological engineering. The examination philosophy of the Woodruff School is to evaluate your understanding of fundamental principles and your ability to apply these principles to solve problems. The English language in both its written and oral forms will be used to solve problems on the qualifying examination. The qualifying examination provides an early assessment of your potential to satisfactorily complete the requirements for the doctoral degree. All students entering the Ph.D. program in the Woodruff School are required to take the examination. The written examination is closed-book and closed-notes.

#### **3.10.2 Mechanical Engineering Qualifying Examination**

The Ph.D. Qualifying Examination consists of two area examinations to be chosen from the Standard Exam Area list or the Special Exam Area list. At least one examination must be selected from the Standard Exam Areas. Each area exam consists of a two-hour, closed-book/closed-note written exam and a one-half hour oral exam. The exams are scheduled over a two-week period in mid-fall semester and mid-spring semester. The dates are emailed to students as soon as they are scheduled.

##### **Standard and Special Exam Areas**

The Standard Exam Areas are based on materials normally covered in the undergraduate core curriculum in mechanical engineering. The Special



Exam Areas include materials at an advanced undergraduate level and/or at a graduate level. Notify the Office of Student Services in writing which two area exams you wish to take.

Standard Exam Areas:

- Applied Mathematics (AMath)
- Design (DE)
- Dynamics and Vibrations (DV)
- Fluid Mechanics (FL)
- Heat Transfer (HT)
- Manufacturing (MFG)
- Mechanics of Materials (MM)
- System Dynamics and Control (SDC)
- Thermodynamics (TH)
- Bioengineering (BE)

Special Exam Areas

- Acoustics (AC)
- Computer-Aided Engineering (CAE)
- Tribology (TR)

3.10.3 Nuclear and Radiological Engineering Qualifying Examination

Examination Format:

The Ph.D. Qualifying Examination consists of two examinations in the area of Nuclear Engineering. Details of the subject areas are given below. Each area exam consists of a two-hour, closed-book/closed-note written exam and a one-half hour oral exam. The exams are scheduled over a two-week period in mid-fall semester and mid-spring semester. The dates are emailed to students as soon as they are scheduled.

Exam NE1

This exam is required of all students appearing for the Nuclear Engineering Qualifying Examination. Courses on whose content the exam will be based are mentioned where available.

- Fundamentals of Radiation Physics and Transport
  - i. NRE/MP 6757, Radiation Physics
  - ii. NRE 6101, Transport Fundamentals

Exam NE2

This exam would include one exam from the following areas. Courses on whose content the exam will be based are mentioned where available.

- Radiation Detection and Protection
  - i. NRE/MP 6757 Radiation Detection;
  - ii. MP 6405, Radiation Protection and Dosimetry
- Reactor Physics

- i. NRE 6201, Reactor Physics;
  - ii. NRE 4204, Nuclear Reactor Physics
- Thermal Hydraulics
  - i. NRE 4214, Reactor Engineering;
  - ii. NRE 6301, Reactor Engineering
- Fusion
  - i. NRE 4610, Introduction to Plasma Physics and Fusion Engineering;
  - ii. NRE 6102, Plasma Physics

Note: Courses are provided as a guideline rather than a firm rule.

#### 3.10.4 Medical Physics Qualifying Examination

Examination Format:

The Ph.D. Qualifying Examination consists of two examinations in the area of Medical Physics. Details of the subject areas are given below. Each area exam consists of a two-hour, closed-book/closed-note written exam and a one-half hour oral exam. The exams are scheduled over a two-week period in mid-fall semester and mid-spring semester. The dates are emailed to students as soon as they are scheduled.

##### Exam MP1

This exam is required of all students appearing for the Medical Physics Qualifying

Examination. Courses on whose content the exam will be based are mentioned where available.

- Fundamentals of Radiation Physics and Detection
  - i. NRE/MP 6757, Radiation Physics
  - ii. MP 6757 Radiation Detection

##### Exam MP2

This exam would include one exam from the following areas. Courses on whose content the exam will be based are mentioned where available.

- Radiation Therapy and Imaging
  - i. NRE/MP 6204 Radiation Therapy
  - ii. NRE/MP 4750, Diagnostic Imaging
- Nuclear Medicine
  - i. NRE 6101 Nuclear Medicine Physics

Note: Courses are provided as a guideline rather than a firm rule.

#### 3.10.5 Bioengineering Qualifying Examination

##### Eligibility

Each Bioengineering Ph.D. student entering with a B.S. degree is required to take the qualifying exam at the end of the student's third academic

semester of study as long as the student maintains the GPA requirements described in the GPA section. Students entering with a M.S. degree must take the exam after two academic semesters of residency, but may petition the Graduate Committee to defer a semester if the need for additional coursework is justified. To take the exam, each student must have passed at least two bioscience and two engineering fundamentals courses listed on the student's approved Program of Study, including a Biological Foundations course. Summer terms do not count as academic semesters of residency. A student may not defer taking the qualifying exam due to a failure to maintain academic requirements.

#### Exam Philosophy

The exam is structured to assess: the student's ability for independent thinking and decision making; knowledge and integration of engineering and biological concepts; and the application of this knowledge to interdisciplinary bioengineering problems. Although the exam will not be coursework specific, it will be tailored to the student's background, graduate coursework and general research area. The exam emphasizes the student's ability to integrate bioscience and engineering concepts to solve bioengineering problems. The committee will evaluate the correctness of the students' responses as well as judge the overall level of breadth, depth and integration of the students' responses. Clarity and conciseness of the presentation of responses is very important.

#### Exam Committee

The exam will be an oral examination administered by a faculty committee consisting of three bioengineering Program faculty members with broad expertise in areas of traditional engineering, biological sciences and bioengineering. The Program Chair will appoint the Qualifying Exam Committee based on the student's background, graduate coursework and research area. The committee members should have a distribution in rank, and should not consist solely of untenured faculty. Up to one non-program faculty member may be used. The thesis advisor is encouraged to attend the exam as an observer. He/she may not make comments during the exam, unless requested to do so by a committee member. The thesis advisor will not be present while the committee is making its final decision on the student's Qualifying Exam performance.

#### Exam Chair Selection

A small subset of the Program faculty will chair the exam committees each year. All exam Chairs will meet prior to and after the exams are administered to address issues of exam uniformity and parity.

#### Procedures Prior to the Exam

1. The Bioengineering Graduate Program Chair will ask the student to provide a one-page write-up of his/her academic background and research work to-date, no less than 6 weeks prior to the exam. This includes a list of courses enrolled in to date. This material and a transcript will be provided to the committee.
2. The student will meet with the exam committee Chair to discuss the philosophy of the exam, the mechanics of the exam and any other points the student or committee Chair deem appropriate. The student may also meet individually with his/her other committee members prior to the exam.
3. Neither the chair nor the committee members will discuss specific exam questions with the student.
4. The Chair of the committee will request, via email, initial exam questions from the committee members. It will be the responsibility of the Chair to ensure that questions are fair and cover the intent of the exam described in the Exam Philosophy subsection. The chair should ensure that the questions are appropriate given the student's research to date and coursework to date. These should be distributed to the committee members before the exam.
5. The scheduling of a first-time qualifying exam date and time will be handled by the Bioengineering Program office. If an exam must be rescheduled, the Exam Committee Chair is responsible for finding a time within the exam period suitable to all other committee members, the student, and the advisor. The Bioengineering Program office must be notified immediately of the new exam time and location.

#### Procedures the Day of the Exam

1. It is the student's responsibility to bring extenuating circumstances (such that the exam should not be held) to the chair's attention before the exam begins.
2. The committee will meet alone for 5 minutes to discuss the order and scope of the exam. The chair will remind the committee of the student's coursework and research to date, as well as how long the student has currently been enrolled.
3. An exam will typically last 90 minutes, and sufficient time should be provided to each committee member to ask questions.
4. During the exam, the chair has the responsibility of ensuring that the exam proceeds on time and within scope.
5. The advisor's presence is solely to ensure that the student received a fair examination. The advisor should not volunteer any information nor ask any questions unless it relates directly to the conduct of the exam.
6. The vote to pass or fail the student will be based on the student's exam performance only.
7. There will be only one vote taken. This vote is binding and conducted by the Chair. Each committee member must make a final decision prior

to the voting, as there will not be a second vote. The voting must take place prior to the exam committee's adjournment. No voting will take place after the adjournment, by e-mail or otherwise.

8. The Chair of the exam committee has the discretion to limit the length of the committee's discussions.
9. Each committee member must complete an evaluation form with appropriate comments at the end of the exam. The exam chair is expected to deliver the evaluations to the program office. The Program Chair uses these evaluations to assess whether the student is meeting the program objectives and to provide additional feedback to the student and advisor regarding the exam performance.

#### Oral Exam Vote

If the vote is 3/0 or 2/1 (where X/Y indicates X vote to pass and Y vote to fail), the student passes the exam. If the vote is 1/2 or 0/3 and the exam is being conducted for the first time for that student, the student must retake the exam. The committee will summarize its decision and detailed recommendations in a memo to the Bioengineering Graduate Program Chair within two days of the exam. The committee's vote will not be recorded, unless the committee unanimously wishes to make its voting an open record. If the vote is 1/2 or 0/3 and the exam is a retake exam, the student fails. The appeal process (described below) is to be followed.

#### Retake Exams

A student may retake the exam only once. At the time of the exam retake, the student must meet the GPA requirement and otherwise be in good academic standing. A retake may only be scheduled either 1) during a regularly scheduled exam period (typically June and January) or 2) within two weeks prior to a scheduled Bioengineering Program faculty meeting. Retake exams are encouraged to occur as soon as possible (within 1-2 months) unless course- work requirements merit a semester delay. Retake students MUST meet with the Program Chair as soon as possible following the exam. The student's advisor is also encouraged to attend.

#### Exam Conditions

An exam committee's decision (pass or fail) may be accompanied by recommended or required conditions. These conditions are based on the committee's interpretation of the student's exam performance relative to the Exam Philosophy. The conditions imposed by the committee should be directly relevant to the student's exam performance. The Bioengineering Graduate Program Chair will monitor the completion or non-completion of these conditions. If the student does not satisfactorily complete all of the Exam Committee conditions, the student cannot continue in the Bioengineering Ph.D. Program.

### Appeals of Second Exam Failures

The Qualifying Exam Committee determines whether the student passes or fails the exam. In the case of a second exam failure, the student's case is automatically considered by the Bioengineering Program faculty at its next scheduled meeting following the student's qualifying exam. At this meeting each student will be discussed, and this discussion will be moderated by the Program Chair. The Chair will solicit comments from the student's research advisor, qualifying exam committee, and the faculty as a whole. Any program faculty member may offer comments or ask questions. A vote is taken by secret ballot and tallied by the Program Chair or his designate. A positive vote of greater than or equal to 2/3 of faculty in attendance is required for a student to remain in the program as a Ph.D. student. This vote is subject to Bioengineering Program quorum requirements. A faculty meeting shall be scheduled as immediately as possible following a regularly scheduled qualifying exam period. There is only one opportunity for appeal.

### Notification of Outcome

Students are notified of a final outcome only after the next faculty meeting, where any appeals, if any, are discussed. Students are not to be told of the results of an exam vote, but only the outcome of the entire process of exam and appeal (i.e. the student remains a Ph.D. student or becomes a M.S. student and must exit the program after satisfying M.S. degree requirements). This also requires that a faculty meeting is scheduled shortly after second exams are taken. The Bioengineering Program Office will notify the student and the student's advisor in writing of the exam outcome and any additional requirements. Faculty should not report the outcome of oral exam decisions directly to students. This allows for fair and timely notification for all students.

#### 3.10.6 Grade Point Average Requirement

You must be registered for the semester in which you take the Ph.D. Qualifying Examination and have full graduate standing. A minimum GPA of 3.3 is required to take the qualifying examination.

#### 3.10.7 Examination Schedule

The exams are given twice a year, once in the fall and once in the spring.

If you already have a master's degree and matriculate as a Ph.D. student, you must take the Ph.D. Qualifying Examination no later than the one-year anniversary of your initial enrollment date in the Woodruff School graduate program.

Those who matriculate with a bachelor's degree must take the qualifying examination no later than the two-year anniversary of your initial enrollment date in the Woodruff School graduate program.

Postponement of the exams will not be allowed as a general rule. However, some flexibility may be allowed for students who do not have an undergraduate degree in mechanical engineering or a closely related area and for those just returning to school after being in industry for some time. If you want to delay taking the qualifying exam, get an endorsement from your faculty advisor, and petition the Woodruff School Graduate Committee.

#### 3.10.8 Preparation Guidelines

The detailed test specifications for the Standard and Special Area Exams in Mechanical Engineering may be found in Appendix D.

Archived exams can be found here: <http://quals.me.gatech.edu/>

#### 3.10.9 Grading and Notification of Examination Results

You will be evaluated on your performance in each area of the qualifying examination by the respective area exam committee. Each area committee reports its assessments to the Woodruff School faculty on a pass/fail/pass-with-condition basis. The faculty then meets to evaluate your overall performance on the entire exam (both area exams).

In **mechanical engineering**, the results of the examination will be one of the following:

**Pass:** You will continue in the Ph.D. degree program and will prepare a Ph.D. proposal.

**Fail:** Students not passing the Ph.D. Qualifying Examination at the first sitting may be allowed to sit at the next offering of the examination for the one or more area exams that were failed. However, the faculty may advise the student after one sitting to leave the Ph.D. program. A student who fails the exam on the second attempt will be asked to leave the Ph.D. program. In retaking the qualifying exam, you may choose to be tested in a different area; however, only one attempt is allowed in this different area.

**Pass With Condition:** A student whose performance has been deemed to be marginally deficient, perhaps on a subset of the material covered, will be offered the option of Pass With Condition. In this case, the student will re-take an oral-only examination with a minimum of two of the three faculty who administered the first oral exam at a time roughly one month from the time of the original exam. The area(s) of deficiency will be communicated clearly to the student and the re-examination will focus on this material. A successful re-examination will result in the student having passed that area

exam; a failed re-examination will constitute a second failure. A student offered Pass With Condition has the option to decline, instead, re-taking the full written and oral examinations the next semester they are offered.

In **Nuclear and Radiological Engineering and Medical Physics**, the grading of the examinations will conform to existing Woodruff School guidelines. The results of the four examinations (three written examinations and the oral examination) will be reviewed by the NRE/MP faculty and reported to the Woodruff School Office of Student Services and the Woodruff School academic faculty.

You will be notified of the results of the exam (pass/fail in each area as well as an overall pass/fail grade) by letter from the Associate Chair for Graduate Studies. The Associate Chair will counsel each student who does not pass the exam. Students not passing the exam are encouraged to discuss their performance with their faculty advisors as well as the chairs of the appropriate area exam committees.

### **3.11 Teaching Practicum**

All Woodruff School Ph.D. students are required to complete three semester hours of Teaching Practicum (ME/NRE 7757) during the course of their doctoral studies.

Students enrolled in the teaching practicum will work closely with a Woodruff School faculty member in all aspects of teaching a course, including the preparation and delivery of a limited number of lectures (usually in the presence of the course professor) tutorials, evaluation of homework, laboratories, and examinations. The faculty member off record will maintain full responsibility for the course. You must do the teaching component and the classwork in the same term.

Students enrolled in the practicum will attend regular meetings to discuss aspects of teaching appropriate to your chosen field. You may not register for this course during the semester in which you expect to receive the Ph.D. ME/NRE 7757 is offered on a pass/fail basis and cannot be used to satisfy the 42 semester-hours course work requirement. Students are not allowed to perform GTA responsibilities in the course for which they are participating in the Teaching Practicum.

The Teaching Practicum Request for specific ME/NRE 7757 assignments is available online. You are encouraged to select a faculty mentor for a specific assignment before the end of the preceding academic term in which you enroll in the practicum. Obtain the approval of both the proposed faculty mentor and your advisor and submit the form online in accordance with the instructions that follow. To gain the full benefit of the Teaching Practicum, only one student may be assigned to a single course in a given semester.



The Teaching Practicum requirement can be satisfied by completing the "Tech to Teaching Intermediate Certificate" program administered by the Georgia Tech CETL Office. The mentored practicum portion of this certificate program, CETL 8715, requires teaching 15% of a course. This course must be a mechanical engineering or nuclear and radiological engineering course, or the course must be approved by the Woodruff School Associate Chair for Graduate Studies.

To initiate your teaching practicum request, please go to the following link and follow the online instructions:

<https://www2.me.gatech.edu/graddb/forms/student/>

### **3.12 Seminars**

All Ph.D. students must register for Seminar 8011 (1 credit hour- no letter grade- attend at least 11 seminars) and Seminar 8012 (1 credit hour- no letter grade- attend at least 11 seminars).

You must keep track of each seminar that you attend (date, speaker, title of seminar). After you attend eleven seminars, submit the online Seminar Registration Form during registration period. Once the approval process is completed, you will be issued a permit to register for seminar credit. Once you have this permission, you must formally register for the seminar course (ME/ NRE 8011 and/or ME/ NRE 8012).

To initiate your Seminar Registration Form, please go to the following link and follow the online instructions:

<https://www2.me.gatech.edu/graddb/forms/student/>

Please note: these courses are offered on a pass/fail basis and therefore are not included in the 42 semester-hours degree requirement. Attendance at a minimum of eleven seminars per credit hour is necessary to pass, with the attendance record being cumulative from semester to semester. Registration for these credits occurs after you attend the requisite number of seminars.

Any graduate research seminar given in the Woodruff School may be used to satisfy this requirement provided that the seminar is not part of another course for which you are registered. Numerous seminars are given by visitors, faculty, and thesis students. Notices are posted on the Woodruff School's Calendar: <http://me.gatech.edu/aggregator/sources/1>. Additional announcements are also posted on the digital display and bulletin board outside the Woodruff School Office of Student Services in MRDC. Graduate students are encouraged to attend seminars regularly.

## 3.13 Ph.D. Proposal

### 3.13.1 Writing the Ph.D. Proposal

#### Objective

The objective of the Ph.D. Proposal is to allow an early assessment of your chosen topic of research for the satisfactory completion of the doctoral degree. The proposal should delineate your specific area of research by stating the purpose, scope, methodology, overall organization, and limitations of the proposed study area. The proposal should include a review of the relevant literature and indicate the expected contribution of the research.

#### Schedule

All graduate students who have successfully completed the Ph.D. Qualifying Examination should submit a Ph.D. proposal to the Woodruff School Office of Student Services within one year after completion of the qualifying examination. A student will not be allowed to graduate without a minimum of six calendar months between the time that his/her Ph.D. Proposal is approved and the time in which he/she completes the Ph.D. Dissertation Defense.

#### Benefits

A well-conceived Ph.D. proposal will help you:

- Develop the critical research questions
- Lay the foundation for the research work to be done
- Isolate pending problems
- Manage your time efficiently
- Map your research progress
- Think through the whole process, indicating the need for an integrated approach

Your proposal should contain a concisely stated hypothesis. After a successful proposal presentation, the Woodruff School Graduate Committee will inform you if the topic is appropriate and that the committee understands what is planned. After the proposal is presented, you are ready to move from perception and comprehension of critical questions to a resolution of the problem.

#### Format

Cover Sheet: The cover sheet for the Ph.D. proposal is the Request for Admission to Ph.D. Candidacy form: <http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>. The cover page is essentially a formal statement that names the dissertation

advisor, sets forth the dissertation topic selected for the investigation, and enumerates a 200-word summary (or abstract) of the proposed dissertation research. The title of the proposed dissertation topic should be brief, scientifically and technically valid, understandable to a scientifically or technically literate reader, and suitable for use in the public press.

**Summary:** The 200-word summary of the proposed research should be a self-contained description of the activity. The summary should be written in the third person and include a statement of objectives, methods to be employed, and the significance of the proposed work to the advancement of knowledge. It should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically literate reader.

**Table of Contents:** A table of contents is required and should show the location of each section as well as the major subdivisions of the project description, such as a summary of previous work, and the methods and procedures to be used.

**Project Description:** The main body of the proposal should be a clear statement of the work to be undertaken. It is limited to 15 pages and should include:

- Objectives of the proposed research and its expected significance
- Relation to longer-term goals of the investigator's project
- Relation to the present state of knowledge in the field, to work-in-progress elsewhere
- Plans of work, including the broad design of activities to be undertaken, an adequate description of experimental methods and procedures, and, if appropriate, plans for preservation, documentation, and sharing of data, samples, physical collections, and other related research products.

**Bibliography:** Citations must be complete (including the full name of the authors, title, year and location in the literature). There is no page limit for this section of the proposal.

**Style and Format:** Brevity will assist your Ph.D. Dissertation Reading Committee in reviewing the Ph.D. proposal. The project description must not exceed 15 pages (30 double-spaced pages is acceptable). Graphical elements, including charts, graphs, maps, photographs, and other pictorial

presentations are included in the 15-page limit. Pages should be of standard size (8½" x 11"; 21.6 cm x 27.9 cm) with 1" or 2.5 cm margins at the top, bottom, and on each side. The type font size must be clear and readily legible and in standard size, which is 10 to 12 points. (Nothing smaller than 10 points should be used.)

Pursuant to the Metric Conversion Act of 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988, your proposal must use the metric system of weights and measures, unless impractical or inefficient.

For more information, please refer to the *Thesis Manual*, *Thesis Templates*, and *Citation Tools* at: <http://gradadmiss.gatech.edu/theses-dissertations>

### 3.13.2 Ph.D. Proposal Process and Presentation

#### Process

Prior to the semester that you are ready to present your Proposal, a composition of your reading committee should be decided in conjunction with your advisor.

Step 1. Identify your Ph.D. reading committee.

- A. You are encouraged to talk to various faculty members regarding possible topics and to begin this process immediately upon embarking on a degree program. Composition of your reading committee should be decided in conjunction with your faculty advisor.
- B. The committee consists of at least five members. The Ph.D. Reading Committee consists of at least five members including the dissertation advisor, who serves as the chairperson. All committee members must have an earned doctorate; in special cases, an individual who does not hold the doctorate may be proposed for membership through petitioning the Graduate Committee. One committee member must be the dissertation advisor (or the co-advisor) and the second committee member shall be tenured or tenure-track academic faculty members with primary or joint appointment in the Woodruff School. The third committee member shall also have a primary or joint appointment in the Woodruff School. Of the last two members, at least one shall be an academic faculty member with no Woodruff School appointment, either primary or joint. At least four of the committee members shall be tenured or tenure-track faculty members; at least one member of the committee shall have a primary appointment in the Woodruff School.

Step 2. Submit the Request for Admission to Ph.D. Candidacy form: <http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>. At the same time, your faculty advisor submits a justification for the composition of the reading committee.

- A. Fill out the Request for Admission to Ph.D. Candidacy form: <http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf> with only your signature and that of your advisor in time for a Woodruff School Graduate Committee meeting. No other signatures are needed at this time. Bring the form to the Office of Student Services for processing.
- B. At the same time, your faculty advisor must email a short justification for the composition of your reading committee to Dr. Andrei Fedorov [AGF@gatech.edu](mailto:AGF@gatech.edu) and cc your Academic Advisor. This step should be completed as early as possible, but not later than the submission of the petition for degree.

Please Note: If a proposed member is not a Georgia Tech faculty member, a CV of that proposed member must also accompany the request

Step 3. Receive approval from the Woodruff School Graduate Committee and then obtain signatures of remaining committee members at your presentation.

- A. The Woodruff School Graduate Committee meets only a few times per semester, please check with your academic advisor concerning meeting dates. After the Committee approves your topic and reading committee, you will receive an email from the Office of Student Services to pick up your form.
- B. Please pick up your original copy of and bring it to your presentation.

#### Change in Title or Abstract

If there are any changes in your Title or Abstract, please complete an updated Request for Admission to Ph.D. Candidacy form: <http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>. Indicate on the form that this is only a change in title, abstract, or both. You and your advisor must sign the form and submit it to the Office of Student Services for processing. Changes to a title or abstract are handled administratively and do not need to go to the Woodruff School Graduate Committee for approval.

#### Change in Reading Committee

If there are any changes to your Reading Committee, it must be submitted to the Office of Student Services on an updated Request for Admission to Ph.D. Candidacy form:

<http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>. Your faculty advisor must e-mail a short justification for the change in Reading Committee to the Associate Chair for Graduate

Studies, Dr. Andrei Fedorov [AGF@gatech.edu](mailto:AGF@gatech.edu). Upon approval by the Woodruff School Graduate Committee.

#### Presentation

Step 1. Provide the completed written Proposal to your committee members.

- A. A copy of the completed final draft of the proposal must be submitted of your reading committee before you are allowed to continue with scheduling the oral presentation.

Step 2. Schedule the Proposal Presentation and submit the Announcement to the Office of Student Services.

- A. Poll the members of your reading committee to establish a date and time for the presentation. Reserve a room for your oral presentation. Submit your announcement at the following link: <https://www2.me.gatech.edu/graddb/forms/student/>

This step must be completed at least two weeks (14 days) before the presentation. The announcement will be posted to the Woodruff School calendar.

Step 3. Submit Final Forms.

- A. Bring the Request for Admission to Ph.D. Candidacy form: <http://www.grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf> to your proposal for them to sign the forms to show their acceptance of your proposal.
- B. Also download the Thesis/Proposal/Dissertation Assessment form: <http://me.gatech.edu/files/grad/EvaluationForm> and bring it to your presentation. Each committee member must fill out and sign the form at the conclusion of your presentation and give the form to the committee chair, who will seal them in an envelope and sign across the flap. Both of the above forms must be handed in to the Office of Student Services for processing.

### **3.14 Ph.D. Dissertation**

#### **3.14.1 Ph.D. Residency Requirement**

Doctoral students must spend at least two full-time semesters in residence at the Georgia Institute of Technology and ordinarily must complete research for the dissertation while in residence. Under special circumstances, candidates who have met the residency requirement may receive permission to pursue their research in absentia, provided the chair of the appropriate school approves and a faculty member directs the project. In either case, doctoral students working full time on thesis

research should be registered for a full course load of "9000" dissertation hours each semester.

### 3.14.2 Guidelines for Ph.D. Dissertation

Doctoral research should provide a useful educational experience that emphasizes creativity, independent action and learning, implementation of research methodology, and a scholarly approach. The research must be relevant to the field in which you are pursuing a degree. The dissertation should demonstrate a high degree of proficiency in the written communication (in English) of research results. It should conform to the Institute's requirements as outlined in the Thesis Manual: <http://gradadmiss.gatech.edu/theses-dissertations>.

After adequate preparation, you must complete a searching and authoritative investigation in your chosen field, culminating in a written dissertation covering that investigation. The dissertation either must be an addition to the fundamental knowledge of the field or a new and better interpretation of facts already known. The dissertation must demonstrate that you possess powers of original thought, a talent for research, and the ability to organize and present findings.

The contribution must be original and, as such, should represent a substantial addition to the fundamental knowledge of the field or a new and better interpretation of facts already known. Dissertations based on well-known principles, techniques, and models applied to situations only somewhat different from previous applications are not acceptable.

The dissertation should contain clear statements about the relevance and importance of the problem as well as the significance, originality, and generality of the research results. The relationship of the research to the literature in the field should be described fully. The dissertation must demonstrate an understanding of the theory and methodology related to its main thrust, and it should reflect knowledge of the application area.

The research should possess the major characteristics of the scientific method, namely, objectivity and reproducibility. Experimental and theoretical research assumptions should be clearly stated. The scope of the research should be such that it requires at least the time and effort equivalent to one year of full-time graduate study. The research should result in at least one paper that might be published in a refereed journal of engineering, science, management, or architecture, as appropriate.

### 3.14.3 Ph.D. Dissertation Defense Process

Your defense must be at least six (6) months after your proposal presentation. After adequate preparation, you must complete a searching and authoritative investigation in your chosen field that culminates in a written dissertation describing that investigation. An oral defense of the dissertation will be scheduled. The following procedure must be followed at the time of the dissertation defense.

Step 1. Provide your completed written Ph.D. Dissertation to the members of your Ph.D. Reading Committee.

You must provide copies of the completed final draft of your dissertation to each member of the Ph.D. Dissertation Reading Committee. This must be done at least two weeks before the final dissertation defense. The defense may be scheduled only after the members of your committee have reviewed the written document and consider the dissertation to be satisfactory.

Step 2. Schedule your Ph.D. Dissertation Defense and submit your Ph.D. Dissertation Defense announcement to the Office of Student Services. Poll your committee and establish a date and time for the defense. Reserve a room and prepare an announcement of the defense. Submit your announcement at the following link:

<https://www2.me.gatech.edu/graddb/forms/student/>

This step must be completed at least two weeks (14 days) before your defense. The announcement will be posted to the Woodruff School Calendar.

Step 3. Submit your Certificate of Thesis Approval.

Before your presentation, complete a Certificate of Thesis Approval form:

<http://www.grad.gatech.edu/sites/default/files/documents/certiphd.pdf> and bring it to your M.S. Thesis Reading Committee members for

them to sign the form to show their acceptance of your thesis.

Also download the Thesis/Proposal/Dissertation Assessment form: <http://me.gatech.edu/files/grad/EvaluationForm> and bring it to your presentation. Each committee member must fill out and sign the form at the conclusion of your presentation and give the form to the committee chair, who will seal them in an envelope and sign across the flap.

Both of the above forms must be handed in to the Office of Student Services.



**IMPORTANT NOTICE:**

You must be registered during the semester in which the final presentation occurs, unless an Enrollment Waiver is requested and approved.

([http://registrar.gatech.edu/docs/pdf/Enrollment\\_Waiver\\_form.pdf](http://registrar.gatech.edu/docs/pdf/Enrollment_Waiver_form.pdf))

**3.14.4 Submitting Your Dissertation**

**Format Check**

You are urged to have your thesis format checked before making the final copies for your committee. To make an appointment to have the format of your thesis checked, please call the Graduate Thesis Office (Savant Building, Room 318) at 404-894-3092, or e-mail [thesis@grad.gatech.edu](mailto:thesis@grad.gatech.edu).

There are deadlines for the initial format check that is one week before the final submission deadline. There is a recommended deadline, but initial format checks will not be done in the week leading up to the thesis deadline; only final submissions will be checked that week. The specific requirements for the format, publication, and distribution of the thesis are explained here: <http://gradadmiss.gatech.edu/theses-dissertations>

**Electronic Submission of Theses and Dissertations**

Paper copies should be given to your advisor and the members of your reading committee, unless the members request a different format.

Please submit your theses electronically to the Graduate Studies office: [grad.gatech.edu/theses-dissertations-electronic-submission](http://grad.gatech.edu/theses-dissertations-electronic-submission)

Enter the requested information about yourself and your thesis/dissertation and upload your thesis or dissertation in PDF format. Once you submit the documents electronically, an e-mail notice will be sent to your committee members.

The Thesis Approval Page will be the second page in your thesis/dissertation, but it will not show any signatures. List the committee members who approved your thesis or dissertation, but remove the signature lines and be certain you type in the date, which is the date that the final draft of your thesis/dissertation was approved.

The Graduate Office will check your electronic document and let you know about any corrections you must make. Make the corrections and resubmit the corrected file. If the Graduate Office has all the related documents, your thesis/dissertation will be approved and they will notify the Registrar's Office that you are eligible to graduate. Once you have graduated, your thesis/dissertation will be released for electronic circulation.

#### 3.14.5 Publication of Dissertation

It is the policy of the Georgia Institute of Technology that doctoral dissertations and master's theses are to be published in the open literature. Extraordinary delays to protect proprietary interests of sponsors are allowed. It is anticipated that all Ph.D. dissertations and a significant fraction of master's theses be published as archival publications in the open, refereed literature. In all cases, doctoral research should meet all the requirements given in the section on General Guidelines for Ph.D. Dissertation Research, and in no situation should these items be compromised to allow for concealing important research results because of security classification or a sponsor's proprietary interest.

Under unusual circumstances and with the approval of the Dean of Graduate Studies, the dissertation may be held by the Dean for a period of time not to exceed one year before transmittal to the Georgia Tech Library for online posting as a PDF file.

#### 3.14.6 Deadlines

The Georgia Tech Graduate Office establishes deadlines for the submission of theses/dissertations. These deadlines are strictly enforced and failure to meet all the deadlines might jeopardize your graduation plans. Please check the link below:

<http://www.gradadmiss.gatech.edu/thesis/thesisdeadlines.php>

## 4. Registration

### 4.1 Basic Registration Information

#### 4.1.1 Holds

- Use the Instructions for Viewing Holds to view any holds before registration begins:  
<http://www.registrar.gatech.edu/registration/holds.php>
- Students cannot register until all holds are removed. There are no exceptions to this.
- Holds can only be removed by the department who placed the hold. Ex: if the Bursar's office placed the hold, then the ME department cannot remove the hold for you. Only the Bursar's office can remove the hold.

#### 4.1.2 Registration Errors

If you have an error while trying to register for a class, look at the registrar's Common Registration Errors:

<http://www.registrar.gatech.edu/registration/error2.php>. We cannot help resolve them unless we know EXACTLY what the error is. An explanation of each error is at each link below:

- Campus Restriction:  
[http://www.me.gatech.edu/files/ug/error\\_campus\\_restriction.pdf](http://www.me.gatech.edu/files/ug/error_campus_restriction.pdf)
- Class Restriction:  
[http://www.me.gatech.edu/files/ug/error\\_class\\_restriction.pdf](http://www.me.gatech.edu/files/ug/error_class_restriction.pdf)
- Closed Section:  
[http://www.me.gatech.edu/files/ug/error\\_closed\\_section.pdf](http://www.me.gatech.edu/files/ug/error_closed_section.pdf)
- Dupl Crse with Sec-XXXXX:  
[http://www.me.gatech.edu/files/ug/error\\_dupl\\_crse.pdf](http://www.me.gatech.edu/files/ug/error_dupl_crse.pdf)
- Grade Mode (Letter Grade, Pass/Fail or Audit):  
[http://www.me.gatech.edu/files/ug/error\\_grade\\_mode.pdf](http://www.me.gatech.edu/files/ug/error_grade_mode.pdf)
- Level Restriction:  
[http://www.me.gatech.edu/undergraduate/registration#level\\_restr](http://www.me.gatech.edu/undergraduate/registration#level_restr)
- Major Restriction:  
[http://www.me.gatech.edu/files/ug/error\\_major\\_restrictions.pdf](http://www.me.gatech.edu/files/ug/error_major_restrictions.pdf)
- Permit Required: [http://www.me.gatech.edu/files/ug/error\\_permit.pdf](http://www.me.gatech.edu/files/ug/error_permit.pdf)
- Preq & Test Score-Error:  
[http://www.me.gatech.edu/files/ug/error\\_preq.pdf](http://www.me.gatech.edu/files/ug/error_preq.pdf)
- Time Conflict with XXXXX:  
[http://www.me.gatech.edu/files/ug/error\\_permit.pdf](http://www.me.gatech.edu/files/ug/error_permit.pdf)

#### 4.1.3 How to Register for Classes

If you are not sure how to register for classes, look at the registrar's Registration Instructions:

<http://www.registrar.gatech.edu/registration/reginfo.php>

#### 4.1.4 Time Tickets

- Time tickets are basically a time stamp that tells you the earliest time you are allowed to register.
- Time tickets are automatically assigned to all students eligible to register. There is nothing that you must do to get a time ticket.
- They are available on OSCAR for viewing at the times listed in the registrar's calendar:  
<http://www.registrar.gatech.edu/registration/calendar.php>, usually 1 business day before registration begins.
- Use the Time Ticket Instructions to check your time ticket:  
<http://www.registrar.gatech.edu/registration/timetickets.php>

#### 4.1.5 Registration Summary

A detailed summary of specific information and instructions relating to registration can be found here:

[http://www.me.gatech.edu/files/grad/RegInfo\\_GS.pdf](http://www.me.gatech.edu/files/grad/RegInfo_GS.pdf)

#### 4.1.6 Variable Hour Courses

- Some courses are offered for a range of credit hours (Ex: ME 9000 is offered for 1-21 hours). When a student registers for a variable hours course the credit hours defaults to 1. It is the student's responsibility to adjust the number of credit hours.
- Variable hours can only be adjusted during active registration times.

##### How to Change the Hours of a Variable Hour Course

1. Go to [www.buzzport.gatech.edu](http://www.buzzport.gatech.edu) and log in.
2. Select Registration - OSCAR.
3. Select Student Services & Financial Aid.
4. Select Registration.
5. Select Add or Drop Classes.
6. Select Term.
7. Select Change Course Options at the bottom of screen.
8. Enter the desired number of hours.

#### 4.1.7 Request a Permit for Seminars or the Teaching Practicum

##### Seminar Classes

- Students must have a permit to register for seminar classes.
- Seminar classes are ME/NRE/MP 8011, ME/NRE/MP 8012, MP 6011 and MP 6012.
- You must attend a minimum of 11 seminars before requesting a permit for the ME seminar class.

##### Teaching Practicum

All Woodruff School Ph.D. students are required to complete three semester hours of Teaching Practicum (ME/NRE 7757) during the course of their doctoral studies.

How to Request a Seminar Permit or Teaching Practicum Permit:

1. Go to the graduate database:  
<https://www2.me.gatech.edu/graddb/forms/student>
2. Complete and submit the form online.
3. You will receive an automated email telling you the permit was issued.
4. You must then register for the class.

#### 4.1.8 Special Problems Courses

A special problem is an individual study in a specialized area under the direction of a member of the Woodruff School faculty. To register for ME/NRE/MP 89XX you must select a project and find a faculty member to direct it. The Special Problems Course form can be submitted online.

Each special problem must culminate in a written final report, which is to be submitted to the advisor for grading. All special problems are given a letter grade. Special Problem credits may not be included as part of the 30 hours of required coursework for master's thesis students.

The Special Problem Statement represents a contract between the student and the Woodruff School. Therefore, the tasks to be performed must be stated clearly and careful consideration should be given to the amount of course credit proposed for these tasks.

##### How to Request a Permit for a Special Problems Class

1. Go to the graduate database:  
<https://www2.me.gatech.edu/graddb/forms/student>
2. Complete and submit the form online.
3. You will receive an automated email telling you the permit was issued.
4. You must then register for the class.

#### 4.1.9 Schedule of Classes

The schedule of classes can be viewed approximately 2 weeks prior to the start of registration. This can be done through the OSCAR - Registration option in Buzzport.

##### ME/NRE/MP Class Schedule

- *6000 Level Classes and Above:* See Appendix A in this Graduate Handbook for the frequency of graduate level course offerings.
- *4000 Level Classes:* There is no published schedule of 4000 level classes. A tentative list by semester is available here: <http://www.me.gatech.edu/undergraduate/registration#sp>

## 4.2 **Overrides, Overloads & Waitlists**

#### 4.2.1 What are Overrides? (Restricted Class Permits, Overloads, Pre-Requisite)

If you need an override, please make sure that you understand what you need! If you ask for the wrong thing, you will still not be able to register for classes.

Restricted Class Permit Overrides - Resolves the following registration errors:

- Major Restriction
- Class Restriction
- Level Restriction
- Permit Required

Overload Overrides - If you cannot register for a class because it is full, then you need an overload override. *Overloads cannot be given for courses using Waitlists.* Resolves the following error:

- Closed Section

Prerequisite Overrides - If you do not have the correct prerequisites or corequisites for a class, you need a prerequisite override. Resolves the following error:

- Preq & Test Score Error

Duplicate Overrides - If you are taking 2 courses with the same CRN number but different sections. (Ex: ME 4803 A & ME 4803 B). Resolves the following error:

- Dupl Crse (Duplicate Course)

#### 4.2.2 Request an Override

If the class you are requesting does not show up in OSCAR using the instructions below, then click here for more information:

<http://www.registrar.gatech.edu/registration/oprequest.php>

Override requests can only be during active registration periods. See the registrar's calendar for registration dates:

<http://www.registrar.gatech.edu/home/calendar.php>

Instructions to Request an Override:

1. Log onto Buzzport: <http://www.buzzport.gatech.edu/>
2. Select **Registration - OSCAR**.
3. Select **Student Services & Financial Aid**.
4. Select **Registration**.
5. Select **Registration Override Request**.
6. Follow the instructions to submit the override request.
7. If your override is approved, you must still register for the class. The override does not automatically register you for the course.
8. Overrides will typically be answered within 48 hours of the request. You will receive an email telling you if the request was approved or denied.

4.2.3 Viewing the Status of Override Requests

All override requests made through OSCAR can be tracked and monitored using the following instructions:

1. Log onto Buzzport: <http://www.buzzport.gatech.edu/>
2. Select **Registration - OSCAR**.
3. Select **Student Services & Financial Aid**.
4. Select **Registration**.
5. Select **Registration Override Request Status**.
6. Students will receive an email when requests made through OSCAR have been processed.

4.2.4 Taking 4000 Level Courses

Graduate students will encounter registration errors while trying to register for most 4000 level courses. Students must make two different override requests for each 4000 level course they wish to take.

Restricted Class Permit - Most undergraduate courses are major restricted or restricted to undergraduates only.

Prerequisite Override - Undergraduate courses have prerequisites enforced in the registration system.

See Section 4.2.2 for instructions on requesting an override.

In general, permits for 4000 level ME on-campus classes will not be approved until phase 2 registration. This is usually very early during the first week of school. Permits for distance learning classes will be approved during phase 1 registration.

#### 4.2.5 Waitlists

Waitlist is an optional function that departments may decide to use. It allows students to sign up for the waitlist for a course that is closed. Waitlist is exactly what it sounds like; you are not registered for the course but you are in line waiting to register for the course. You will need to wait for everybody else who is in line before you to register before you.

If a class section uses a waitlist, then no overloads are given in that class. There are no exceptions to this.

Once a student has waitlisted for a course section, a notification will be sent via email if a seat becomes available in that section.

Waitlisted students are notified on a first-come-first-serve basis.

If a seat becomes available, students will have 12 hours to register for the course section after the email notification is sent. Students who do not register in that 12 hour time frame will lose their seat in the class and on the waitlist.

Waitlist is NOT registration and does not guarantee enrollment in the course.

Click here for instructions to identify course sections that use the waitlist option: <http://www.registrar.gatech.edu/registration/waitlisting.php>

Click here for instructions to waitlist for the course section: <http://www.registrar.gatech.edu/registration/waitlisting.php>

If you drop a waitlisted class that you are registered for, you will not be able to get the class back without using the waitlist. You will need to register for the waitlist, and you will be last in the queue.

View Your Place on The Waitlist

1. Log onto Buzzport: <http://www.buzzport.gatech.edu/>
2. Select **Registration - OSCAR**.
3. Select **Student Services & Financial Aid**.
4. Select **Registration**.
5. Select **Student Detail Schedule**. It will show you your place on the waitlist on that screen.

### 4.3 **Restrictions on Classes & Campus Codes**

#### 4.3.1 Campus Restrictions: Is this class is offered in Atlanta?

Campus restriction errors

([http://www.me.gatech.edu/files/ug/error\\_campus\\_restriction.pdf](http://www.me.gatech.edu/files/ug/error_campus_restriction.pdf)) occur if you try to register for a class not offered in Atlanta. All Atlanta classes have a campus code (CMP) of 'A'.



Classes offered at any location other than Atlanta, usually have a section code starting with R or Q. (ex. RMZ, RCC, RPK, ROX, R, QUP, etc.)

- R: These courses are offered on a different GT campus such as Lorraine, Oxford, etc.
- Q: These courses are for distance learning students only.

#### How to View the Campus Code for a Class

1. Look at the class listing in OSCAR. Click here for instructions and screenshots:

[http://www.me.gatech.edu/files/ug/error\\_campus\\_restriction.pdf](http://www.me.gatech.edu/files/ug/error_campus_restriction.pdf)

2. Find the column labeled CMP. CMP stands for campus code.
3. Only classes with a CMP (campus code) of 'A' are in Atlanta.
4. Any other campus code will give you a campus restriction error.

#### 4.3.2 Viewing Notes on Classes in the Registration Systems

Use the procedure below to view details about classes listed in OSCAR.

1. Log onto Buzzport: <http://www.buzzport.gatech.edu/>
2. Select **Registration - OSCAR**.
3. Select **Student Services & Financial Aid**.
4. Select **Registration**.
5. Select **Look Up Classes**.
6. Select the **Term** and press **Submit**.
7. Select the subject you are interested in and press **Course Search**.
8. Select the class number and press **View Sections**.
9. After the classes are listed on the screen, click on the hyper linked **CRN Number** of the class.
10. Any footnotes, comments or notes about the classes are listed on this screen. If the class is a special problems class, the class title should be listed here.
11. Click on the hyper linked **Title of the Class**.
12. The pre-requisites and restrictions of the class are listed on that screen.

#### 4.3.3 FAQ: Registration

1. **Q.** How many hours are considered full time and part-time?  
**A.** *Full time is at least 12 hours. Part-time is at least 3 hours.*
2. **Q.** How many hours must a student register for in a term?  
**A.** *If you are receiving assistance in the form of Graduate Research Assistantship, Graduate Teaching Assistantship and/or Fellowship, you are required to register for a minimum of 12 hours.*

*If you are not receiving assistance, the minimum is 3 hours.*

3. **Q.** How do I change a class from pass/fail to letter grade?  
**A.** *Instructions to change the grade mode during active registration times are:*

*Log into Buzzport*

*Registration and Student Services*

*Select –Students Services & Financial Aid*

*Select-Registration*

*Select-Add/Drop Classes*

*Select-Term*

*Select Change Course Options*

*Select -Add/Drop Classes*

*After Phase 2 registration closes and before the last day to drop an individual class for the semester, students can change the grade mode from letter grade to pass/fail using the Request for Grade Mode Change form. This can only be done for classes that are offered in both grade modes.*

*After phase 2 registration closes, there is no way to change the grade mode to or from audit mode.*

4. **Q.** I would like to audit a ME course. Is this possible?

**A.** *No, we do not offer ME courses as audit credit. You may check with the individual instructor and ask if it would be okay for you to sit in on the class.*

## 5 Other Services

### 5.1 Accidents and Injuries

When it comes to work-related injuries you might be both a student and an employee of Georgia Tech. If you are GRA or a GTA, you are on the payroll and considered a Georgia Tech employee. If you suffer a job-related injury when acting in your GRA/GTA (employee) capacity, you are covered by Worker's Compensation. If the injury requires emergency treatment, follow the guidelines established for Georgia Tech employees. Contact the Georgia Tech Police at (404) 894-2500. Choose a physician from the list of physicians posted at various locations in Woodruff School buildings. Seek treatment at the nearest Emergency Room, but not at the Student Health Center, which is not authorized to treat Georgia Tech employees.

If you are a GRA/GTA and suffer a non work-related injury while functioning as a student, the Student Health Center will provide medical treatment. The same procedures apply to co-op students. Contact the Georgia Tech Police. For more information on work-related injuries and other accidents, see [Redbook.pdf](#)

If you have an accident, send a report to Mr. Cary Ogletree, Facilities Project Manager, at email or (404) 385-8612.

### 5.2 Office Space

Office space in the Woodruff School is limited, however desks are available for many full-time, on-campus graduate students. Graduate research and teaching assistants and other students working on a research project under the direction of a faculty member are usually assigned desk space in a laboratory associated with that research. Use the Graduate Student Request form to request office/desk space in MRDC, Love, GTMI (MaRC), IBB, or Boggs. After being approved, see Dorothy McDuffie-Alexander in the Facilities office (Love, Room 245) to pick up your key.

To initiate your room/key request, please go to the following link and follow the online instructions: <https://www2.me.gatech.edu/graddb/forms/student/>.

If you note any problems with this automated process, please notify the Office of Student Services by sending an email directly to Wayne Whiteman.

You can change your ME Password at the following site: <https://password.me.gatech.edu>. Otherwise please contact Computer Support at [computer.support@me.gatech.edu](mailto:computer.support@me.gatech.edu).

Priority for office assignments is as follows:

- Ph.D. students who have passed the qualifying exam;
- Ph.D. students who have not yet taken or passed the qualifying exam;
- Master's thesis students;
- Master's non-thesis students working on research or having GTA responsibilities;
- Undergraduate students working on research.

## 5.3 Computers and Networking

### 5.3.1 Office of Information Technology

Shortly after entering Georgia Tech, the Office of Information Technology (OIT) will create a user account and password for each student. This is referred to as a GT account. These accounts provide a UNIX programming environment, an e-mail account, a home page location, and other services. The GT account is the official e-mail account used by students in the Woodruff School for communications. To obtain/activate your user account and password, change your account information or passwords go to: <http://passport.gatech.edu>, or visit the OIT resource center on the ground floor of the Library West, or call OIT customer support at (404) 894-7173.

Off-campus students will receive a form and information about their GT account in their orientation packets. This form should be faxed to the Center for Distance Learning (CDL) at (404) 894-8924. The CDL will process your request and send you an account.

OIT's customer support pages are at: [www.oit.gatech.edu/help/overview.cfm](http://www.oit.gatech.edu/help/overview.cfm) or they can be reached by phone at (404) 894-7173.

### 5.3.2 High-Performance Computers

Access to high-performance research computer resources are available. For more information, about these resources contact Stephen Fuller at 404-894-2039 or email <http://pace.gatech.edu/>.

### 5.3.3 Woodruff School Help Desk

For desktop computer assistance, printer support, reservations, or other computer and network support see: <http://www.me.gatech.edu/support/computer>.

Contact the Woodruff School Help Desk at (404) 894-7193, or by e-mail at [support@me.gatech.edu](mailto:support@me.gatech.edu).

IP addresses that connect computers to the network can be requested at <http://www.me.gatech.edu/support/computer/iprequest>

In addition, the Help Desk has some laptops and LCD projectors that are available for checkout for use at presentations. There is no charge for the labor to repair GT owned computer equipment, but parts will be charged to your advisor or a lab account. For more information, see <http://www.me.gatech.edu/support/computer>

#### 5.3.4 Computer Labs

The Woodruff School maintains two computer labs for student, faculty, and staff use. The MRDC Open Lab (MRDC, Room 3328) and the NRE Open Lab (Boggs 3-11).

#### 5.3.5 MRDC Open Lab

The MRDC Open Lab has 18 Wyse thin-client machines that connect to Georgia Tech's Virtual Lab Infrastructure. This lab utilizes the ME VLAB pool (ME-2015) for access to this infrastructure. The School also maintains a VLAB which is also accessible from any location by visiting: <https://mycloud.gatech.edu/>

Before you log in, review the posted material. You should be programmed twenty-four hours a day for access to the cluster with your Buzz Card. If this is not the case, contact facilities for help.

#### 5.3.6 Printing

There are two printers in the MRDC Open Lab that are managed by GT Printing & Copy Services. The Black & White printer (ME Black) has a per page fee, which is cheaper than the per page fee for the Color printer (ME Color). Students can use their BuzzCard to pay for printing. Students receive a weekly printing allowance. Printers are located in various buildings on campus. Locations and rates can be found here: <http://print.gatech.edu/student-printing>

Central printing services or central-ps is printed at a central location and delivered to the Student Center Computer Cluster (2nd floor near the Music Listening Room). This service is free of cost for students. More information can be found here: <http://print.gatech.edu/central-ps>

Georgia Tech Multimedia Studio provides low-cost printing services for different large scale printing (such as posters). Information about the multimedia studio can be found at: <https://www.library.gatech.edu/multimedia-studio>

#### 5.3.7 Wireless/Walkup Network (LAWN)

The Georgia Tech Local Area Wireless/Walkup Network (LAWN) provides a connection in common areas of the buildings where there is normally no access. OIT supports the LAWN from 8 a.m. to 5 p.m. Monday through Friday. There are instructions to connect to the LAWN in the lobbies of the Love and MRDC buildings. System requirements, locations covered, and instructions also can be found online at: <http://lawn.gatech.edu>.

For additional assistance regarding connections to the wireless or walkup network, please contact the help desk at (404) 894-7193 or send an email.

### 5.4 **Copiers & Faxes**

Ph.D. students teaching courses in the Woodruff School may use the copy machines located in their individual building for teaching-related work. Graduate teaching and research assistants do not have such access. For other copying jobs, see your advisor.

### 5.5 **Academic Forms & Submit Publications/Awards**

This link can be used to access various Woodruff School Academic forms. Please also use this link to submit Publications/Awards. Students can view these forms at: <https://www2.me.gatech.edu/graddb/forms/student/>.

### 5.6 **Shops, Laboratory, and Equipment Purchases**

The Montgomery Machining Mall, and the Electronics Lab are valuable Woodruff School resources. Most of the construction in these shops is done by the professional staff. However, you are advised to discuss a project with the appropriate shop manager who often can make suggestions that will reduce construction time and cost or improve function.

Purchases of equipment and other items require the approval of a faculty member who will supply the necessary research account number to which the purchase is to be charged. Purchases for research and other projects should be planned in advance so that a minimum number of purchases are made. Where necessary, charges will be made to a P-card (a State of Georgia Visa charge account).

### 5.7 **Montgomery Machining Mall**

The Montgomery Machining Mall provides the Schools of ME, ECE, MSE, and the College of Sciences with research and curriculum support. The MMM staff maintains a professional fabrication\learning space with a focus on safety. Please

visit the MMM for more information. The Montgomery Machining Mall is located on the second floor of the MRDC Building in the Wepfer Design Commons.

If you have the appropriate skills, you may be allowed to use the Montgomery Machining Mall. You will be asked to attend a Montgomery Machining Mall safety training class or to demonstrate appropriate skills to shop personnel. A Waiver of Liability form must be signed by your advisor and submitted to the Montgomery Machining Mall manager prior to using the machines. More information about the Montgomery Machining Mall can be found here:

[https://www.me.gatech.edu/facilities/machine\\_shop](https://www.me.gatech.edu/facilities/machine_shop)

A Montgomery Machining Mall work request can be obtained at:

<https://memachineshop.gatech.edu/request/request.php>

## **5.8 The Invention Studio**

The Invention Studio is a student run organization located in the Flower's Invention Studio, and supports ALL students, staff, and faculty in building their dream project, whether it's for research, personal or academic usage. Tools are 100% free to use. The Flowers Invention Studio is made up of three major areas: the Hub, the Wood Shop, and the Metal Shop, located on the second floor of the MRDC. More information about the Invention Studio can be found here:

<https://inventionstudio.gatech.edu/>

## **5.9 Electronics Lab**

The Electronics Lab is located in Room 2104 of the MRDC Building. The ME Electronics Lab provides electrical circuit design and minor repair services for Woodruff School faculty, staff and students. The Electronics Lab also provides assistance or consulting for projects as well as help with troubleshooting circuit issues on projects. There are two circuit board milling machines that are capable of producing two layer circuit boards. Two work benches with electronics test equipment are provided in the lab for students to use on a first come first serve basis during our lab work hours. Help with soldering is provided by electronics lab personnel if requested.

The Electronics Lab also has test equipment students can check out for a limited amount of time. The Electronics Lab also offers training on how to use the LPKF S63 circuit board milling machine which is in the invention studio.

Contact [electronics.lab@me.gatech.edu](mailto:electronics.lab@me.gatech.edu) to discuss your requirements. More information about the Electronics Lab can be found here:

[http://www.me.gatech.edu/facilities/electronic\\_lab](http://www.me.gatech.edu/facilities/electronic_lab)

## 6 Appendices

### APPENDIX A Frequency of Graduate Course Offerings by Course Number

Courses	Title	Term/Frequency
ME 4193	Tribological Design	Every Fall
ME 4757	Biofluid Mechanics	Every Fall and Spring
ME 4758/6743	Tissue Mechanics	Every Fall
ME 4853	Applied Tribology Lab	Every Spring
ME 6101	Engineering Design	Every Fall
ME 6102	Designing Open Engineering Systems	Every Spring
ME 6103	Optimization in Engineering Design	Fall, Even Years
ME 6104	Computer-Aided Design	Every Spring
ME 6105	Modeling&Simulation Design	Every Fall
ME 6124	Finite Element Method: Theory & Practice	Every Spring
ME 6201	Principles of Continuum Mechanics	Every Fall
ME 6203	Inelastic Deformation of Solids	Every Spring
ME 6204	Micromechanics of Materials	Spring, Even Years
ME 6222	Manufacturing Processes and Systems	Every Fall
ME 6223	Automated Manufacturing Process Planning	As Required
ME 6224	Machine Tool Analysis & Control	Spring, Even Years
ME 6225	Metrology and Measurement Systems	As Required
ME 6242	Mechanics of Contact	Fall, Odd Years
ME 6243	Fluid Film Lubrication	Every Spring
ME 6244	Rotordynamics	Every Fall
ME 6281	Mechanics of Paper Forming and Coating	Every Spring
ME 6301	Conduction Heat Transfer	As Required
ME 6302	Convection Heat Transfer	Every Spring
ME 6303	Thermal Radiation Heat Transfer	As Required
ME 6304	Principles of Thermodynamics	Every Fall
ME 6305	Applications of Thermodynamics	Every Summer
ME 6309	Nanoscale Heat Transfer	Spring, Even Years
ME 6401	Linear Control Systems	Every Fall
ME 6402	Nonlinear Control Systems	Every Spring



ME 6403	Digital Control Systems	Every Spring
ME 6404	Advanced Control System Design and Implementation	As Required
ME 6405	Introduction to Mechatronics	Every Fall
ME 6406	Machine Vision	Every Fall
ME 6407	Robotics	Every Spring
ME 6441	Dynamics of Mechanical Systems	Every Fall
ME 6442	Vibration of Mechanical Systems	Every Spring
ME 6444	Nonlinear Systems	Spring, Odd Years
ME 6449	Acoustic Transducers & Signal Analysis	Every Fall
ME 6452	Wave Propagation in Solids	Every Spring
ME 6601	Introduction to Fluid Mechanics	Every Fall
ME 6602	Viscous Flow	Every Spring
ME 6622	Experimental Methods	Every Spring
ME 6720	Biotransport	Every Spring
ME 6746	Rehab Engineering	Every Spring
ME 6753	Principles of Management for Engineers	Every Fall and Spring
ME 6754	Engineering Database Management Systems	As Required
ME 6760	Acoustics I	Every Spring
ME 6761	Acoustics II	Every Fall
ME 6762	Applied Acoustics	As Required
ME 6765	Kinetics & Thermodynamics of Gases	Every Fall
ME 6766	Combustion	Every Spring
ME 6768	Polymer Structure, Physical Properties & Characterization	Every Spring
ME 6769	Linear Elasticity	Every Fall
ME 6770	Energy & Variational Methods in Elasticity & Plasticity	As Required
ME 6776	Integrated Low-Cost Microelectronics Systems Packaging	Every Fall
ME 6777	Advanced Biomaterials	Every Spring
ME 6779	Therm Pkg-Micro/Nano Systems	As Required
ME 6782	Cellular Engineering	Every Fall
ME 6784	Cardiovascular Biomechanics	As Required
ME 6789	Technology Ventures	Spring, Even Years
ME 6792	Manufacturing Seminar	Every Fall and Spring
ME 6793	Systems Pathophysiology	Every Fall
ME 6794	Tissue Engineering	Every Spring , Sometimes in Fall

ME 6796	Structure-Property Relationships in Materials	Every Fall
ME 6799	Legal Issues in Technology Transfer	Every Fall
ME 7000	Master's Thesis	Every Term
ME 7101	Seminar in Engineering Design	As Required
ME 7203	Advanced Constitutive Relations of Solids	As Required
ME 7227	Rapid Prototyping in Engineering	Fall, Even Years
ME 7301	Transport Phenomena in Multiphase Flow	Fall, Even Years
ME 7442	Vibration of Continuous Systems	Fall, Even Years
ME 7602	Hydrodynamic Stability	As Required
ME 7751	Computational Fluid Dynamics	Every Spring
ME 7757	Teaching Practicum	Every Fall and Spring
ME 7771	Mechanics of Polymer Solids and Fluids	As Required
ME 7772	Fundamentals of Fracture Mechanics	Every Fall
ME 7774	Fatigue of Materials & Structures	Every Spring
ME 7775	Topics in Fracture and Fatigue of Metallic & Composite Materials	As Required
ME 8011	Seminars in Mechanical Engineering	Every Spring
ME 8012	Seminars in Mechanical Engineering	Every Summer
ME 8801/2/3/4/5/6	Special Topics in Manufacturing	As Required
ME 8803	Design and Fabrication of MEMS Devices	Every Fall
ME 8803 TUM	Microelectronic Systems Packaging Technology	As Required
ME 8811/2/3/4/5/6	Special Topics in Computer-Aided Engineering and Design	As Required
ME 8821/2/3/4/5/6	Special Topics Tribology	As Required
ME 8831/2/3/4/5/6	Special Topics in Thermal Sciences	As Required
ME 8841/2/3/4/5/6	Special Topics in Automation and Mechatronics	As Required
ME 8851/2/3/4/5/6	Special Topics in Acoustics and Dynamics	As Required
ME 8861/2/3/4/5/6	Special Topics Fluid Mechanics	As Required
ME 8871/2/3/4/5/6	Special Topics in Bioengineering	As Required
ME 8881/2/3/4/5/6	Special Topics in Mechanics of Materials	As Required
ME 8901/2/3/4/5/6	Special Problems in Manufacturing	As Required
ME 8911/2/3/4/5/6	Special Problems in Computer-Aided Engineering and Design	As Required
ME 8921/2/3/4/5/6	Special Problems in Tribology	As Required

ME 8931/2/3/4/5/6	Special Problems in Thermal Science	As Required
ME 8941/2/3/4/5/6	Special Problems in Automation and Mechatronics	As Required
ME 8951/2/3/4/5/6	Special Problems in Acoustics & Dynamics	As Required
ME 8961/2/3/4/5/6	Special Problems in Fluid Mechanics	As Required
ME 8971/2/3/4/5/6	Special Problems in Bioengineering	As Required
ME 8981/2/3/4/5/6	Special Problems in Mechanics of Materials	As Required
ME 8997	Teaching Assistantship	Every Term
ME 8998	Research Assistantship	Every Term
ME 9000	Doctoral Thesis	Every Term
MP4750	Diagnostic Imaging Physics	Every Spring
MP 6101	Nuclear Medicine Physics	Every Fall
MP 6203	Radiation Therapy Physics Laboratory	Every Fall (start 2009)
MP 6204	Radiation Therapy Physics	Every Spring
MP 6300	Radiological Anatomy	Every Fall
MP 6401	Medical Health Physics	Every Fall
MP 6402	Radiation Dosimetry	Every Fall
MP 6407	Radiation Biology and Oncology	Every Fall
MP 6756	Radiation Physics	Every Fall
MP 6757	Radiation Detection	Every Spring
MP 7000	Master's Thesis	Every Term
MP 8011/12	Seminars in Medical Physics	Every Term
MP 8104	Clinical Rotation in Radiation Therapy	Every Summer
MP 8801/2/3/4/5/6	Special Topics in Medical Physics	Every Term
MP 8801/2/3/4/5/6	Special Problems in Medical Physics	Every Term
MP 9000	Doctoral Dissertation	Every Term
NRE 6101	Transport Fundamentals	Every Fall
NRE 6102	Plasma Physics	Every Spring
NRE 6103	Computational Methods of Radiation Transport	As Required
NRE 6105	Radiation Shielding	As Required
NRE 6201	Reactor Physics	Every Spring
NRE 6301	Reactor Engineering	As Required
NRE 6401	Advanced Nuclear Engineering Design	Every Spring
NRE 6501	Nuclear Fuel Cycle	As Required
NRE 6502	Nuclear Materials	As Required
NRE 6755	Radiological Assessment and Waste Management	Spring, Even Years
NRE 6756	Radiation Physics	Every Fall

NRE 6757	Radiation Detection	Every Spring
NRE 7000	Master's Thesis	Every Term
NRE 7103	Advanced Plasma Physics	As Required
NRE 7203	Advanced Reactor Physics	As Required
NRE 7757	Teaching Practicum	Every Term
NRE 8011/2	Seminars in NRE	Every Term
NRE 8801/2/3/4/5/6	Special Topics in Nuclear Engineering	As Required
NRE 8901/2/3/4/5/6	Special Problems in Nuclear Engineering	As Required
NRE 8997	Teaching Assistantship	Every Term
NRE 8998	Research Assistantship	Every Term
NRE 9000	Doctoral Dissertation	Every Term

## APPENDIX B      Graduate Course Offerings by Research Group and Semester

<b>MECHANICAL ENGINEERING</b>				
<b>GROUP</b>	<b>FALL</b>	<b>SPRING</b>	<b>SUMMER</b>	<b>AS REQUIRED</b>
Acoustics & Dynamics	6441 6443 6449 6761 7442E	6442 6444O 6452 6760 6762O 7764O		885X
Automation, Robotics & Control	6401 6405 6406	6402 6403 6407		6404 884X 894X
Bioengineering	4757 4758 6743 6782 6793	4757 6720 6746 6777 6794		6778 6783 6784 887X 897X
Computer-Aided Engineering & Design	6101 6103E 6105 7227E 8813	6102 6104 6124 7228O 8813		881X 891X
Fluid Mechanics	6601 6604E	6602 6622 7751		7602 886X 896X
Heat Transfer	6304 6601 7301E	6301 6302 6303 (INT) 6303E (ADV) 6309E	6305	8833
Manufacturing	6222 6792 7771	6223E 6225E 6768 6792		7226 7793
Mechanics of Materials	6201 6769 6795 6796 7772	6203 6204E 6770 7774 7792		6759 6797 7201 7203 888X 898X

MEMS	6229	8803		880X 890X
Tribology	4193 6242O 6244	6243 4853		882X 892X
Other	6753 7000 7757 8010 8997 9000	6753 7000 7757 8011 8997 9000	7000 7757 8012 8997 9000	
<b>NUCLEAR &amp; RADIOLOGICAL ENGINEERING PROGRAM</b>				
<b>GROUP</b>	<b>FALL</b>	<b>SPRING</b>	<b>SUMMER</b>	<b>AS REQUIRED</b>
NRE/MP	NRE 6101 NRE/MP 6756 MP 6101 MP 6203 MP 6300 MP 6401 MP 6402 MP 6407	NRE 6102 NRE 6201 NRE 6401 NRE/MP 6757 NRE/MP 4750 MP 6204	MP 8104	NRE 6103 NRE 6105 NRE 6301 NRE 6434 NRE 6501 NRE 6502 NRE 6755 NRE 7103 NRE 7203
Other	NRE/MP 7000 NRE 7757 NRE 8011 NRE/MP 880X NRE/MP 890X NRE 8997 NRE 8998 NRE/MP 9000	MP/NRE 7000 NRE 7757 NRE 8012 NRE/MP 880X NRE/MP 890X NRE 8997 NRE 8998 NRE/MP 9000	NRE/MP 7000 NRE 7757 NRE/MP 880X NRE/MP 890X NRE 8997 NRE 8998 NRE/MP 9000	

## APPENDIX C ME, MP, and HP Video and Online Course Offerings

MECHANICAL ENGINEERING		
Fall, Even Years	ME 6101	Engineering Design
	ME 6103	Optimization in Engineering Design
	ME 6201	Principles of Continuum Mechanics
	ME 6244	Rotordynamics
	ME 6303	Thermal Radiation Heat Transfer
	ME 6401	Linear Control Systems
	ME 6441	Dynamics of Mechanical Systems
	ME 6601	Introduction to Fluid Mechanics
	ME 6765	Kinetics & Thermodynamics of Gases
	ME 6770	Energy and Variational Methods
	ME 7227	Rapid Prototyping in Engineering
Spring, Odd Years	ME 6102	Designing Open Engineering Systems
	ME 6104	Computer-Aided Design
	ME 6203	Inelastic Deformation of Solids
	ME 6223	Automated Manufacturing Process Planning
	ME 6243	Fluid Film Lubrication
	ME 6301	Conduction Heat Transfer
	ME 6302	Convection Heat Transfer
	ME 6305	Applications of Thermodynamics
	ME 6309	Nanoscale Heat Transfer
	ME 6402	Nonlinear Control Systems
	ME 6407	Robotics
	ME 6442	Vibration of Mechanical Systems
	ME 6602	Viscous Flow
	ME 6622	Experimental Methods
	ME 6754	Engineering Database Management Systems
	ME 6760	Acoustics I
	ME 6762	Applied Acoustics
	ME 6766	Combustion
	ME 7772	Fundamentals of Fracture Mechanics
	ME 7774	Fatigue of Materials & Structures

Fall, Odd Years	ME 6101	Engineering Design (Online Video Course)
	ME 6105	Modeling & Simulation Design
	ME 6201	Principles of Continuum Mechanics
	ME 6222	Manufacturing Processes and Systems
	ME 6242	Mechanics of Contacts
	ME 6244	Rotordynamics
	ME 6304	Principles of Thermodynamics
	ME 6401	Linear Control systems
	ME 6441	Dynamics of Mechanical Systems
	ME 6601	Introduction to Fluid Mechanics
	ME 6765	Kinetics and Thermodynamics of Gases
	ME 6770	Energy and Variational Methods
	ME 7442	Vibration of Continuous Systems
	ME 7772	Fundamentals of Fracture Mechanics
Spring, Even Years	ME 6102	Designing Open Engineering Systems
	ME 6104	Computer-Aided Design
	ME 6203	Inelastic Deformation of Solids
	ME 6223	Automated Manufacturing Process Planning
	ME 6224	Machine Tool Analysis and Control
	ME 6243	Fluid Film Lubrication
	ME 6301	Conduction Heat Transfer
	ME 6302	Convection Heat Transfer
	ME 6305	Applications of Thermodynamics
	ME 6402	Nonlinear Control Systems
	ME 6403	Digital Control Systems
	ME 6407	Robotics
	ME 6442	Vibration of Mechanical Systems
	ME 6622	Experimental Methods
	ME 6760	Acoustics I
	ME 6766	Combustion
	ME 7774	Fatigue of Materials & Structures



<b>MEDICAL PHYSICS</b>		
Fall, Every Year	MP/NRE 6756	Radiation Physics
Fall, Every Year (starting fall 2009)	MP 8011	Seminar in Medical Physics
Fall, 2008, 2011, 2014	MP 6402*	Radiation Dosimetry
Fall, 2008, 2011, 2014	MP 6300	Radiological Anatomy
Fall 2010, 2013, 2016	MP 6203	Radiation Therapy Physics Laboratory
Spring, Every Year (starting spring 2009)	MP 8012	Seminar in Medical Physics
Spring 2009, 2012, 2015	MP 6204*	Radiation Therapy Physics
As needed, Every Term	MP 8104	Clinical Rotation
*Has prerequisite MP/NRE 6756		

## APPENDIX D Test Specifications for ME Ph.D. Qualifying Area Exams

### D.1 Exam Area Undergraduate Courses

Georgia Tech courses that cover the equivalent preparatory subject matter in the Standard Examination Areas are summarized below.

EXAM AREA	UNDERGRADUATE COURSES
Applied Mathematics (AMath)	Math 4305, 4581, ME 2016
Design (DE)	ME 2110, 3180, 4182
Dynamics & Vibrations (DV)	ME 2202, 3017, 4189
Fluid Mechanics (FL)	ME 3340
Heat Transfer (HT)	ME 3345, 4315
Manufacturing (MFG)	COE 3001, ME 4210, ME 4214, MSE 2001
Mechanics of Materials (MM)	COE 2001, COE 3001, ME 4214
Systems Dynamics and Controls (SDC)	ME 3017, 4452
Thermodynamics (TH)	ME 3322, 4315
Bioengineering (BE)	ME 6743, 6782, 4757, 6720

### D.2 Applied Mathematics (AMath)

#### Objective and Scope

The purpose of this examination is to evaluate the student's ability to solve engineering problems using mathematical models. Topics will be drawn from:

1. Vector Calculus
  - a. Gradient, divergence, and curl operators
  - b. Divergence, Green's, and Stokes' theorems
2. Linear Algebra
  - a. Finite-dimensional vector spaces and subspaces
  - b. Linear independence
  - c. Orthogonality of vectors and subspaces
  - d. Properties of the determinant
  - e. Eigenvalues and eigenvectors
3. Linear Ordinary Differential Equations
  - a. Initial-value problems
  - b. Two-point boundary-value problems
  - c. Homogeneous and nonhomogeneous solutions
  - d. Solution techniques
  - e. Laplace transforms
  - f. Solution of systems of ODE's using matrix methods

4. Linear Partial Differential Equations
  - a. Classification of PDE's
  - b. Separation of variables
  - c. Laplace transforms
  - d. Fourier transforms
5. Elementary Numerical Analysis
  - a. Root-finding techniques, e.g. bisection, Newton-Raphson, secant, and fixed-point
  - b. Curve fitting by the method of least squares
  - c. Functional approximation using Fourier series or polynomial series
  - d. Numerical integration, e.g., trapezoidal rule and Simpson's rule
  - e. Integration of ODEs, e.g., Euler, Runge-Kutta, and predictor-corrector methods

#### Courses

The examination will be based on materials normally covered in the following courses: MATH 4305 (Topics in Linear Algebra), MATH 4581 (Classical Mathematical Methods in Engineering), and ME 2016 (Computer Applications).

#### References

1. Boyce, W. E. and R. C. DiPrima, Elementary Differential Equations
2. Chapra, S. C. and R. P. Canale, Numerical Methods for Engineers
3. Davis, H. F. and A. D. Snider, Introduction to Vector Analysis
4. Hildebrand, F. B., Advanced Calculus for Applications
5. Powers, D. L., Boundary Value Problems
6. Strang, G., Linear Algebra and Its Applications

### D.3 Design (DE)

#### Objective and Scope

The purpose of this exam is to evaluate a student's ability to design engineering systems efficiently and effectively. The exam will cover the conception, planning, evaluation and implementation of engineering system designs. Emphasis is placed on engineering systems which are interdisciplinary and typically require the consideration and integration of several of the traditional engineering disciplines. Therefore, to a large extent, success in this examination will depend upon a student's ability to apply design methods and integrate basic knowledge of the engineering sciences. Specific areas which are emphasized in the examination are as follows:

#### 1. Design Methods

Designers should use a systematic and methodical approach when designing engineering systems. Knowledge and understanding about design methods; the identification of design requirements; and continuous quality improvement are examples of the topics examined. A student may be given a statement describing the need for a particular functionality and then be asked to design an appropriate engineering system to satisfy this functionality. A student will be

rewarded based on the ability to solve the problem in a sound and systematic way and to identify questions which are worthy of further research.

## 2. Physical Realizability

Insight into technical, economic, quality and environmental factors and their effect on the subsequent physical realizability of design concepts is required. Questions related to manufacturing, cost, quality, safety, sustainability, wear, etc., can be expected. What makes one implementation better than another? What are some existing components which could be utilized? Should they be utilized?

## 3. Analysis

The student should appreciate the role of analysis in engineering design and be capable of ascertaining the implications of analysis results during design. One aspect is the ability to use the appropriate engineering science knowledge to analyze a design with respect to the design requirements. For instance, will structural failure occur in the design? A more important aspect is the interpretation of the analysis and the identification of ways to improve the design with respect to the requirements. For instance, how can structural failure be avoided with a minimum of weight increase?

### Courses

The examination will assume knowledge of material normally covered in the undergraduate core curriculum in mechanical engineering at Georgia Tech, but will presume the maturity and experience commensurate with a graduate student at the master's level. The primary courses to which this examination will relate are: ME 3180 (Machine Design); ME 2110 (Creative Decisions and Design); and ME 4182 (Capstone Design). In addition, ME 4210 (Manufacturing Process and Engineering) will be useful. At the graduate level, ME 6101 (Engineering Design) provides an introduction to a systematic design method and is recommended.

### References

1. Pahl, G., W. Beitz, K. Wallace, L. Blessing, and F. Bauert, Engineering Design Berlin Springer Verlag, 1996.
2. C. R. Mischke and R. Budynas, Shigley's Mechanical Engineering Design, 8th Edition. New York: McGraw-Hill, 2007.

## D.4 Dynamics & Vibrations (DV)

### Objectives and Scope

The purpose of this examination is to evaluate the student's understanding of the principles governing the dynamics of rigid and elastic systems and to synthesize those principles to predict the response of mechanical systems. A key aspect of the required expertise is demonstrated by the ability to anticipate and explain response characteristics based on physical arguments. Topics will be drawn from the following:

1. Kinematics of particles and rigid bodies  
Analysis of velocity and acceleration for curvilinear motion, motion relative to a moving reference frame, angular motion, linkages, rolling bodies.
2. Kinetics of particles and rigid bodies  
Free-body diagrams, inertia properties, equations of motion for planar and spatial motion, static and dynamic balancing, gyroscopic effect, linear and angular impulse-momentum principles, work-energy principle.
3. Vibration of one-degree-of-freedom systems  
Free response with damping, response to harmonic, periodic and transient vibration, vibration measurement and control.
4. Vibration of systems having several degrees of freedom  
Evaluation of natural frequencies and modes, modal response to excitation, harmonic forced response, vibration absorbers, Raleigh ratio.
5. Vibration of simple continuous systems  
Natural frequencies and modeshapes for simple structures such as strings, rods, and flexural beams. Estimation of natural frequencies using approximate techniques such as assumed modes, or Rayleigh-Ritz.

#### Courses

The examination requires a thorough understanding of the material covered in ME 2202 (Dynamics of Rigid Bodies), and ME 4189 (Structural Vibrations). Many of these topics are covered in greater detail in ME 6441 (Dynamics of Mechanical Systems) and ME 6442 (Vibration of Mechanical Systems) , but the examination is set at the undergraduate level. In addition, the exam assumes a familiarity with many concepts from ME 3017 and 4452 (System Dynamics) including modeling of mechanical systems, transient/steady-state response, and stability.

#### References

1. Ginsberg, J. H., Mechanical and Structural Vibrations, Theory and Applications
2. Ginsberg, J. H., Advanced Engineering Dynamics
3. McGill, D. J. and W. W. King, An Introduction to Dynamics
4. Meirovitch, L., Elements of Vibration Analysis
5. Rao, V. V., Mechanical Vibrations

### D.5 Fluid Mechanics (FL)

#### Objective and Scope

The purpose of this examination is to evaluate the student's understanding of the fundamental principles of fluid mechanics. Topics will be drawn from the following:

1. Fundamentals  
Properties of fluids; Eulerian and Lagrangian descriptions; streamlines, streaklines, and pathlines; stress in fluids; boundary and initial conditions.

2. Fluid statics  
Forces on submerged and partially submerged objects; buoyancy.
3. Control-volume forms of basic principles  
Mass, momentum and energy balances; Bernoulli's equation.
4. Local forms of basic principles  
Continuity, and Navier-Stokes equations; irrotational motion; velocity potential and stream function; simplification of equations and solution of problems.
5. Dimensional analysis  
Buckingham Pi theorem, similarity.
6. Viscous flow through pipes  
Laminar and turbulent flow; head loss; friction factor; major and minor losses; Moody chart (Colebrook formula) analysis.
7. Boundary-layer flows  
Scaling; boundary-layer equations; integral methods; similarity solutions; separation.
8. Turbulence  
Scaling arguments.

#### Courses

This examination will be based on material covered in ME 3340 (Fluid Mechanics)

#### References

1. Munson, B. R., D. F. Young, T. H. Okiishi, and W. W. Huebsch, Fundamentals of Fluid Mechanics, 6th edition.
2. Fox, R. W. P. J. Pritchard, and A. T. McDonald, Introduction to Fluid Mechanics. 7th edition.

### D.6 Heat Transfer (HT)

#### Objective and Scope

The purpose of this examination is to determine if the student is adequately prepared to perform independent research in the heat transfer area. This requires fundamental knowledge in each of the classical mechanisms of heat transfer. The student must be able to classify particular applications according to regimes using nondimensional groups and other aids. In addition, the student should be able to formulate mathematical models for a variety of applications. The examination may include material from conductive, radiative and convective heat transfer areas and will be based on a minimum of undergraduate training.

#### Courses

The examination will be based on material normally covered in the following undergraduate courses offered in mechanical engineering at Georgia Tech: ME 3345 (Heat Transfer), and ME 4315 (Energy Systems Analysis and Design).

## References

1. Moran and Shapiro, Fundamentals of Engineering Thermodynamics
2. Incropera and DeWitt, Fundamentals of Heat & Mass Transfer
3. Munson, Young and Okiishi, Fundamentals of Fluid Mechanics

### D.7 Manufacturing (MFG)

#### Objective and Scope

The purpose of this examination is to evaluate a student's ability to synthesize and analyze manufacturing processes for various materials. Emphasis will be placed on materials processing techniques, thus typically requiring consideration of several of the traditional engineering disciplines. To a large extent, success in this examination will depend on the ability to integrate and bring to bear upon the problem at hand basic knowledge of the engineering sciences such as mechanics and material properties and, to a lesser extent, design and fluid and thermal sciences. Knowledge of major material processing techniques is expected. Several of the specific areas which may be emphasized in the examination include the following:

#### 1. Ingenuity and Judgment

Success as a manufacturing engineer depends strongly on one's ability to generate numerous alternative process designs and judiciously select the ones which warrant further consideration. The focus will be on defining the geometric and behavior modifications required of raw materials to produce finished products and on determining the appropriate manufacturing process(es) required to affect these changes. Tolerances on the product in terms of the geometry and behavior also need to be considered when defining a manufacturing process. Monolithic examination of a single idea will not be richly rewarded.

#### 2. Analysis

The ability to apply appropriate physical principles and analytical techniques to draw conclusions regarding the feasibility of proposed processes will be emphasized. Typical questions are as follows: How is a product made? What clues does an artifact give you on the way it was made? What are the appropriate material models and what are their limitations? What are the mechanics (stresses, forces) of the process? What are the thermal and fluid considerations? How does the material react to the physical, thermal and fluid forces generated in the process?

#### 3. Optimization

What are meaningful measures of merit and of performance for the proposed processes? How can process parameters be adjusted to achieve optimum performance?

#### 4. Physical Realizability

Can the proposed process be implemented with available equipment? Is the process economically viable? How will manufacturing tolerances affect the end product's performance? What are the safety considerations?

#### Courses

The examination will assume knowledge of material normally covered in the undergraduate core curriculum in Mechanical Engineering at Georgia Tech, but will presume the maturity and experience commensurate with a graduate student at the Master's level. The primary subjects to which this examination will relate to are: MSE 2001 (Principles and Applications of Engineering Materials); ME 4210 (Manufacturing Processes); and ME 4214 (Mechanical Behavior of Materials). The following courses in the areas of design and fluid and thermal science also will be pertinent: ME 3180 (Machine Design); ME 3322 (Thermodynamics); ME 3340 (Fluid Mechanics), and ME 3345 (Heat Transfer). Further, ME 6222 (Manufacturing Engineering and Systems) provides in-depth knowledge of the material at a graduate level, and is suggested for students taking the exam, especially those who did not take ME 4210 as undergraduates.

#### References

1. Ashby, M. F. and D. R. H. Jones, Engineering Materials I and II. Oxford: Pergammon Press 1988.
2. Kalpakjian, S. and S. R. Schmid, Manufacturing Processes for Engineering Materials, 5th Edition. Prentice Hall, Pearson Education Inc., Upper Saddle River, NJ, 2008.
3. Tlusty, G., Manufacturing Processes and Equipment, Prentice-Hall, Upper Saddle River, NJ, 2000.

### D.8 Mechanics of Materials (MM)

#### Objective and Scope

The purpose of this examination is to evaluate the student's capacity for logical reasoning, problem definition, problem solving, and knowledge of basic engineering skills in mechanics of materials in order to establish the qualifications of the student to pursue a Ph.D. program of study.

The student must demonstrate basic concepts in solid mechanics and mechanical behavior of engineering materials. Focus is on material from undergraduate courses, including: basic statics; mechanics of deformable bodies; and mechanical behavior of polymers, metals, ceramics and composites. Basic assumptions and limitations of simple classical beam and torsion theories are stressed, along with fundamental concepts of stress-strain relations, strain-displacement relations, boundary conditions, and simple theories for deformation and failure of engineering materials.



### Courses

As each university offers a different curriculum, Georgia Tech courses are specified below which cover the equivalent preparatory subject matter. Although the subject matter on the test is at the undergraduate level, the students are expected to possess a graduate level understanding of the material. Precisely, this means they should thoroughly understand the assumptions and limitations of simple theories. Moreover, they are expected to understand the basic elements of the field equations necessary to solve general boundary value problems (e.g., stress-strain, strain-displacement, equilibrium and appropriate boundary conditions).

The following are equivalent undergraduate courses to which this examination will relate: COE 2001 Statics, COE 3001 Mechanics of Deformable Bodies, ME 4214 Mechanical Behavior of Materials.

### References

1. Dowling, Mechanical Behavior of Materials.
2. Gere James M., Goodno Barry: Mechanics of Materials, Cengage Learning, 2009

## D.9 System Dynamics and Control (SDC)

### Objective and Scope

The purpose of this examination is to evaluate the student's understanding of the fundamental principles of interacting multidomain (such as mechanical, electrical, fluid, and thermal) dynamic systems and ability to apply these principles to modeling and control of physical systems. Emphasis will be placed on the formulation of mathematical models of physical systems, prediction and interpretation of system behavior, and the improvement of system performance through feedback. Topics will be drawn from the following:

1. Physical system modeling  
Representation of a real physical system by an analytical lumped-parameter model (both linear and nonlinear); linearization; derivation of transfer function; state-space and block diagram representation and reduction technique.
2. Dynamic behavior of linear systems  
Concepts of poles and zeros, transient, steady-state, and frequency response, and dynamic stability.
3. Improvement of dynamic response through feedback  
Classical analysis and design of continuous-time, linear feedback control systems including root locus and frequency response techniques.

### Courses

The examination will be based on materials normally covered in the undergraduate core curriculum in mechanical engineering at Georgia Tech. The primary core subjects to which this examination will relate are ME 3017 (System

Dynamics). Candidates will also find the material covered in ME 6401 (Linear Control Systems) and ME 6403 (Digital Control Systems) will strengthen their position relative to the examination. However, no questions will be asked that require specialized techniques or advanced concepts which normally would be covered at the graduate level.

#### References

1. Franklin, Powell, and Emami-Naeini, Feedback Control of Dynamic Systems , 5th edition. Addison-Wesley, 2005.
2. Golnaraghi and Kuo, Automatic Control Systems , 9th edition. Prentice-Hall, 2009.
3. Ogata, Modern Control Engineering, 5th edition. Prentice-Hall, 2009.
4. Ogata, System Dynamics, 4th edition. Prentice Hall, 2003.
5. Shearer, Murphy and Richardson, Introduction to System Dynamics. Addison-Wesley, 1967.

### D.10 Thermodynamics (TH)

#### Objective and Scope

Candidates should be familiar with the basic principles of thermodynamics and their application to evaluating the properties of simple substances and ideal mixtures and to analyzing representative engineering systems at an academic level of complexity. Expected familiarity and possible and exemplary topics follow:

#### 1. Basic Principles

Includes the Zeroth law and the energy and entropy principles, heat and various common forms of work, and the properties of pure substances, ideal gases, and ideal gas mixtures. Students should be familiar with these elementary principles and capable of applying these principles to engineering systems.

#### 2. Thermodynamics of Systems, Processes, and Cycles

Includes consideration of open and closed systems in transient and steady-state processes including energy and entropy analysis. Such systems may include multiple-port systems such as heat exchangers and mixers and two-port steady-flow steady-state systems including important components such as pumps, nozzles, turbines, and diffusers. Such analysis may include basic applications of exergy as the measure of potential work.

#### 3. Thermodynamics of Properties

Covers the nature of extensive and intensive properties and understanding and application of the state postulate and the phase rule, the  $T ds$  equations, the detailed properties of ideal gases, the general and typical properties of real fluids, and use of tabulated properties and proper use of SI units. No conventional units will be used in the exam. Ideal gas mixtures may be considered, but detailed psychrometrics will not be addressed on the exam.

Exam problems often involve ideal gases with constant specific heats as well as contrasting situations where the temperature variation must be considered.

#### 4. Engineering Applications

Students should be very familiar with the common power and refrigeration cycles including the well-established gas and vapor cycles. Nevertheless, exams typically challenge the student to analyze sometimes subtle or sometimes disparate variations on these cycles, so students should have developed an independent capacity to analyze representative engineering systems. Basic familiarity must include the following: (1) Common gas cycles such as the Carnot and Stirling cycles and the air standard Otto and Diesel and similar cycles, (2) Vapor Cycles to understand include the basic steam cycle and the steam cycle with superheat, reheat, and extraction and similar vapor power cycles (3) Refrigeration Cycles to include the Carnot and vapor compression cycles for refrigeration and heat pumping. Students should be familiar with the classical systems and cycles studied in undergraduate courses but should also be capable of analyzing and discussing both typical enhancements and novel or unusual variations. Students are usually not tested on applications far removed from main-stream applications in thermal and fluid power, thermal processing, refrigeration, heat pumps, and the thermodynamics of fluid and heat transfer machinery.

#### 5. Second Law Analysis

Includes the calculation of entropy generation and irreversibility and related issues. Some related issues are (1) Principles and applications of stream and system exergy (This terminology is preferred to equivalent concepts such as "thermodynamic availability"), and (2) The limiting performance of systems including the evaluation of performance indices such as the so-called "Second Law Effectiveness" or "Combined Laws Efficiency" ratios. When addressed, such figures of merit will typically be defined for the student. Students are expected to apply the general principles and thermodynamic property relations in entropy analysis and related second-law analysis.

#### Courses

The exam will be based on materials covered in ME 3322 (Thermodynamics) and ME 4315 (Energy Systems Analysis and Design).

#### References

1. Moran and Shapiro, Thermodynamics
2. Black and Hartley, Thermodynamics
3. Keenan, Thermodynamics
4. Van Wylen and Sonntag, Thermodynamics

## D.12 Bioengineering (BE)

### Objective and Scope

The purpose of this examination is to evaluate the student's understanding of the fundamental principles of bioengineering. The emphasis will be placed on the modeling analysis and measurement of the mechanics of the biological systems including cellular biomechanics, biofluid dynamics, and biosolid mechanics. The examination may include material from the following:

1. Mechanical properties of cells
2. Cell adhesion
3. Cell locomotion
4. Analysis of unsteady flows in elastic tubes
5. Flow patterns in curved and branched tubes
6. Techniques of velocity and shear stress measurement.
7. Fluid mechanics of the carotid artery, the coronary artery, and the abdominal aorta.
8. Viscoelasticity
9. Biological responses to mechanical stimuli
10. General laws for constitutive equations
11. Soft tissue biomechanics
12. Blood vessel mechanics

### Courses

Examination will be based on undergraduate biomechanics material. This material is reviewed in ME 4758 (Biosolid Mechanics)/ ME 6743 (Tissue Mechanics), ME 6782 (Cellular Engineering), and ME4757 (Biofluid Mechanics) /ME 6720 (BioTransport).

### References

1. Caro, C. G., Pedley, T. J., Schroter, R. C., Seed, W. A. The Mechanics of the Circulation. Oxford Medical Publications, Oxford, 1978.
2. Fung, Y. C. Biodynamics, Circulation. Springer-Verlag, New York, 1984.
3. Fung, Y. C., Biomechanics: Motion, Flow, Stress, & Growth. Springer-Verlag, New York, 1990.
4. Fung, Y. C., Biomechanics: Mechanical Properties of Living Tissue, 2nd edition. Springer-Verlag, New York, 1993.

#### D.13 Special Examination Areas

The Special Exam Areas include materials at an advanced undergraduate level and/or at a graduate level. The equivalent preparatory courses for the Special Examination Areas offered at Georgia Tech are summarized as follows:

EXAM AREA	TECHNICAL COURSES
Acoustics (AC)	ME 6760, 6761
Computer-Aided Engineering (CAE)	ME 2016, 4041, 6104, 6124
Tribology (TR)	ME 4193, 6243

Each Special Exam Area is described below.

#### D.14 Acoustics (AC)

##### Objective and Scope

The purpose of this examination is to evaluate the student's understanding of the fundamental principles of acoustics. The student must demonstrate the ability to attack problems with a correct approach and show the ability to analyze problems and results with critical judgment in a manner compatible with doctoral level expectations. Topics will be drawn from the following:

1. Equations of continuity, momentum, and state  
Linear acoustic wave equation in fluids; pressure-density relations; speed of sound; plane waves, spherical waves, energy, intensity, directivity, power.
2. Frequency band analysis, Fourier series, and Fourier transforms  
Frequency weighting; coherent and incoherent sound; combining levels; power spectral density.
3. Reflection, transmission, specific acoustic impedance, standing waves, radiation from traveling flexural waves, critical frequency multilayer transmission and reflection, transmission of transients, transmission through solid slabs, plates, and blankets.
4. Radially and transversely oscillating spheres, monopoles, Green's function, dipoles, quadrupoles; Kirchhoff-Helmholtz integral theorem; Rayleigh integral; radiation from a baffled piston.

##### Courses

The examination will be based on materials covered in ME 6760-ME 6761 (Acoustics I and II).

##### References

1. Pierce, A.D., Acoustics : An Introduction to Its Physical Principles and Applications . Reprinted by the Acoustical Society of America , 1988.
2. For a complement, see also Kinsler, Frey, Coppens, and Sanders, Fundamentals of Acoustics, 3rd edition. J. Wiley, New York , 1982.

## D.15 Computer-Aided Engineering (CAE)

### Objective and Scope

The purpose of this exam is to evaluate a student's ability to apply the fundamental principles underlying computer-aided engineering to design and analysis problems in mechanical engineering. Emphasis will be placed on real systems which are subject to more than one physical phenomena (compressive and transverse loading, mechanical and thermal loading, etc.). The student should appreciate the role of computer-aided analysis in engineering design and be capable of ascertaining the implications of analysis results. To a large extent, success in this examination will depend upon the student's ability to integrate and apply basic knowledge of the engineering sciences to the formulation and solution of problems using numerical and computational methods. Specific topics emphasized in the examination include the following:

#### 1. Numerical Methods

Formulation and solution of engineering analysis problems using various numerical methods, including methods for numerical differentiation and integration, solving of ordinary differential equations, linear regression, root finding, optimization, eigenvalue, and boundary value problems. The student should understand sources of error and their implications for practical implementations of typical numerical methods. After finding the solution to an analysis problem, the students should be able to interpret the results: What does this imply for an engineering problem? How sensitive is the solution to changes in loading and boundary conditions? Or to changes in parameter values?

#### 2. Finite Element Analysis

Formulation and solution of finite element models. Given a "real-world" analysis problem, you may have to select appropriate element types and identify appropriate boundary and loading conditions. Insight into identifying the governing physical phenomena for engineering systems will also be important. The student should understand the governing principles and assumptions underlying the finite element technique.

#### 3. Geometric Modeling

Curve and surface modeling techniques. Given an engineering design problem, which curve/surface modeling technique would be appropriate, based on an understanding of fundamental technique properties and analysis of problem requirements? Why are components shaped the way they are and how would their shape be described (using CAD systems)? Other topics include the limitations of curve and surface models and the application of geometric modeling to shape design and component analysis, with analysis related to the formulation of finite element and other types of models.

### Courses

The examination will assume knowledge of material normally covered in the undergraduate core and elective courses in mechanical engineering at Georgia Tech, but will presume the maturity and experience commensurate with a graduate student at the master's level. The undergraduate courses to which this examination will relate are ME 2016 (Computing Techniques), and ME 4041 (Interactive Computer Graphics and Computer-Aided Design). At the graduate level, the following courses are recommended: ME 6104 (Computer-Aided Design); ME 6124 (Finite Element Method: Theory and Practice).

### References

1. Cook, R. D, D. S. Malkus, and M. E. Plesha, Concepts and Applications of Finite Element Analysis, . John Wiley and Sons, New York, Latest Edition.
2. Loga, D. L., A First Course in the Finite-Element Method, Thompson, Latest Edition.
3. Hoffman, J. D., Numerical Methods for Engineers and Scientists. McGraw-Hill, New York, Latest Edition.
4. Chapra, S. C. and Canale, R. P., Numerical Methods for Engineers, McGraw-Hill, NY, Latest Edition.
5. Zeid, I., Mastering CAD/CAM, McGraw-Hill, Latest Edition.

## D.16 Tribology (TR)

### Objective and Scope

The purpose of this examination is to evaluate the student's understanding of the fundamental principles of tribology. Topics will be drawn from the following:

1. Surface roughness
2. Hertzian contact
3. Rough surface contact
4. Friction
5. Time varying phenomena
6. Wear
7. Lubrication regimes: full film, mixed and boundary
8. Hydrostatic lubrication
9. Hydrodynamic lubrication
10. Elasto-hydrodynamic lubrication
11. Seals
12. Liquid lubricants
13. Solid lubricants
14. Surface modification

### Courses

The course covered in the examination is: ME 4193, ME 6243

### References

1. Williams, J. A., Engineering Tribology, Cambridge University Press, 2005.

2. Hutchings, I. M., Tribology: Friction and Wear of Engineering Materials, CRC Press, 1992.
3. Hamrock, B.J., Schmid, S.R. and Jacobson, B.O., Fundamentals of Fluid Film Lubrication, 2nd Ed., Marcel Dekker, 2004.



## **APPENDIX E      Forms**

Change of Advisor Form (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Outside Employment Request for GWW Graduate Students

[http://me.gatech.edu/files/grad/outside\\_employment\\_request.doc](http://me.gatech.edu/files/grad/outside_employment_request.doc)

Doctoral Teaching Intern Application

[http://me.gatech.edu/files/grad/Woodruff\\_TI\\_Program.doc](http://me.gatech.edu/files/grad/Woodruff_TI_Program.doc)

Special Problems Form (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Certificate of Completion of PSE Coursework

<http://me.gatech.edu/files/grad/pse.pdf>

Proposed MSME Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Proposed MS Undesignated Program of Study

[http://me.gatech.edu/files/grad/MSund\\_ProgStudy.doc](http://me.gatech.edu/files/grad/MSund_ProgStudy.doc)

Proposed NE Master's Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Proposed MP Master's Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Proposed Bioengineering Master's Program of Study

[http://me.gatech.edu/files/grad//MS\\_BIO\\_ProgStudy.doc](http://me.gatech.edu/files/grad//MS_BIO_ProgStudy.doc)

Proposed PSE Master's Program of Study

[http://me.gatech.edu/files/grad/MSPSE\\_ProgStudy.doc](http://me.gatech.edu/files/grad/MSPSE_ProgStudy.doc)

Request for Approval of Master's Thesis Topic

[http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform\\_aug27.pdf](http://www.grad.gatech.edu/sites/default/files/documents/mastersthstopicform_aug27.pdf)

Certificate of Thesis Approval for Master's Students

<http://grad.gatech.edu/sites/default/files/documents/certifims.pdf>

Graduate Petition for Degree

[http://www.registrar.gatech.edu/docs/pdf/GRAD\\_PETITION\\_FOR\\_DEGREE.pdf](http://www.registrar.gatech.edu/docs/pdf/GRAD_PETITION_FOR_DEGREE.pdf)

Equipment Checkout Clearance

<http://www.me.gatech.edu/sites/default/files/EquipmentCheckout%20201902.doc>

Enrollment Waiver

[http://me.gatech.edu/files/grad/Enrollment Waiver form.pdf](http://me.gatech.edu/files/grad/Enrollment%20Waiver%20form.pdf)

Thesis/Proposal/Dissertation Assessment

<http://www.me.gatech.edu/files/grad/Thesis-Proposal-Dissertation-Evaluation-Form.docx>

Seminar Registration Form (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Teaching Practicum Request (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Mechanical Engineering Proposed Ph.D. Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Nuclear Engineering Proposed Ph.D. Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Medical Physics Proposed Ph.D. Program of Study (LOGIN)

<https://www2.me.gatech.edu/graddb/forms/student/>

Paper Science and Engineering Proposed Ph.D. Program of Study

[http://me.gatech.edu/files/grad/PhD\\_PSE\\_ProgStudy.pdf](http://me.gatech.edu/files/grad/PhD_PSE_ProgStudy.pdf)

Bioengineering Proposed Ph.D. Program of Study

[http://me.gatech.edu/files/grad/PhD\\_BIO\\_ProgStudy.doc](http://me.gatech.edu/files/grad/PhD_BIO_ProgStudy.doc)

Robotics Proposed Ph.D. Program of Study

<http://me.gatech.edu/files/grad/robotics.pdf>

Request for Admission to Ph.D. Candidacy

<http://grad.gatech.edu/sites/default/files/documents/phdcandidacyform-101714.pdf>

Faculty Consent Form

<http://me.gatech.edu/files/grad/faculty-consent.doc>

Certificate of Approval for Doctoral Students

<http://grad.gatech.edu/sites/default/files/documents/certiphd.pdf>

Graduate Student Room/Key/Equipment Request (LOGIN)  
<https://www2.me.gatech.edu/graddb/forms/student/>

Montgomery Machining Mall Student Work Request  
[http://me.gatech.edu/facilities/machine\\_shop](http://me.gatech.edu/facilities/machine_shop)

## APPENDIX F      Sample MSME Program of Study Templates

Please note that all of the MSME course work is elective, within the overall degree requirement framework cited in the MS section of the grad handbook.

While not required, below are links to sample program of study templates that may help in assembling an MSME Program of Study in different mechanical engineering fields. These templates should in no way be considered strict guidelines that must be followed. They are merely meant to give students some sense of what course work they might take to complete their MS requirements in a particular field.

The classes listed in each template are the courses in the “coherent major area.” All the courses do not need to be from one particular field. In fact, there may even be recommendations of courses from other Schools in the College of Engineering, or there may be suggestions for courses from the Colleges of Science or Computing that might fit nicely into the particular field. Please note that all of your coursework in the major area does not have to come from the School of Mechanical Engineering

### F.1      Acoustics

<b>Acoustics - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME 4760	Engineering Acoustics and Noise Control
	ME 6760	Acoustics I
	ME 6761	Acoustics II
	ME 6762	Applied Acoustics OR ME 6769: Linear Elasticity
	ME 6452	Wave Propagation in Solids
	ME 4189	Structural Vibrations
	ME 6758	Numerical Methods in Mechanical Engineering
<b>Minor</b> (Signal Processing) (2 courses – 6 credit hours)	ME 6449	Transducer and Signals
	ECE 6279	Spatial Array Processing
<b>Math</b> (1 course – 3 credit hours)	MATH 4305	Topics in Linear Algebra OR
	MATH 4581	Math Methods in Engineering OR
	MATH 6701	Mathematical Methods of Applied Sciences I OR
	MATH 6702	Mathematical Methods of Applied Sciences II

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of acoustics.

## F.2 Automation, Robotics and Control

<b>Automation, Robotics and Control - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME 6401	Linear Control Systems
	ME 6402	Nonlinear Control Systems
	ME 6403	Digital Control Systems
	ME 6404 OR ME 6406	Advanced Control System Design and Implementation OR Machine Vision
	ME 6405 and/or ME 6408	Introduction to Mechatronics and/or Advanced Mechatronics
	ME 6441	Dynamics of Mechanical Systems
	ME 6407	Robotics
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of automation, robotics, and control.

## F.3 Bioengineering

<b>Bioengineering - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME 6782	Cellular Engineering
	ME 6777	Advanced Biomaterials
	ME 6720	Biotransport
	ME 6201	Principle-Continuum Mech
	ME 6743	Tissue Mechanics
	ME 6793	Systems Pathophysiology
	ME 6794	Tissue Engineering
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of bioengineering.

#### F.4 Computer Aided Engineering

<b>Computer Aided Engineering - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME6104	Fundamentals of CAD
	ME6124	FEM Theory and Practice
	ME 8813 or ME 8813	Computational Nano-Engineering OR Probabilistic Risk Assessment
	ME6101	Engineering Design
	-ME 6102	Designing Open Engineering Systems
	ME 6103	Optimization in Engineering Design
	ME8813	Sustainable Systems Design
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of computer aided engineering.

#### F.5 Design

<b>Design - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME 8813	Sustainable Systems Design
	ME 6101	Engineering Design
	ME 6102	Designing Open Engineering Systems
	ME 6103	Optimization in Engineering Design
	ME6124	FEM Theory and Practice
	ME 8813	Computational Nano-Engineering
	ME 8813	Probabilistic Risk Assessment

<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course
	Student selected minor area course
<b>Math</b> (1 course – 3 credit hours)	Student selected math course

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of design.

#### F.6 Dynamics and Vibration

<b>Dynamics and Vibration - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME 6441	Dynamics
	ME 6442 OR ME 4189	Vibration of Mechanical Systems OR Structural Vibrations
	ME 6443	Variational Methods in Engineering
	ME 4760 OR ME 6760	Engineering Acoustics and Noise Control OR Acoustics
	ME 6452	Wave Propagation in Solids
	ME 7442	Vibration of Continuous Systems
	ME 6401 OR ME 6405	Linear Control Systems OR Introduction to Mechatronics
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of dynamics and vibrations.

## F.7 Fluid Mechanics

<b>Fluid Mechanics - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME6601	Introduction to Fluid Mechanics
	ME6602	Viscous Flow
	ME6304	Principles of Thermodynamics
	ME7751	Computational Fluid Mechanics
	ME8833	Fundamentals of Heat and Mass Transfer
	ME6622	Experimental Methods
	ME6302	Convection Heat Transfer (HT)
	Other potential course choices to replace the ones above:	
	ME6301	Conduction HT
	ME6303	Radiation HT
	ME8833*	Computational Heat Transfer*
	ME7301*	Transport Phenomena in Multiphase Flow*
	ME6305	Applications of Thermodynamics
	ME7602*	Hydrodynamic Instability*
	* These courses are offered Bi-Annually	
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as "required." You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of fluid mechanics.

## F.8 Heat Transfer, Combustion, and Energy Systems

<b>Heat Transfer, Combustion, and Energy Systems - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME6304	Principles of Thermodynamics
	ME6601	Intro to Fluid Mechanics
	ME8833	Fundamentals of Heat and Mass Transfer
	ME6301	Conduction Heat Transfer (HT)
	ME8833*	Computational Heat Transfer*
	ME6305	Applications of Thermodynamics



	ME6779*	Thermal Packaging of Micro-Nano Systems
	Other potential course choices to replace the ones above:	
	ME6302	Convection HT
	ME6303	Radiation HT
	ME7301*	Transport Phenomena in Multiphase Flow
	* These courses are offered Bi-Annually	
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of thermal sciences and energy systems.

#### F.9 Manufacturing

Manufacturing - Sample Program of Study		
<b>Major</b> (7 courses – 21 credit hours)	ME 4793	Composite Materials & Processes
	ME 6222	Manufacturing Processes and Systems
	ME 6223	Automated Manufacturing Process Planning
	ME 6224	Machine Tool Analysis & Control
	ME 6225	Metrology and Measurement Systems
	ME 6405	Introduction to Mechatronics
	ME 6408	Advanced Mechatronics
<b>Minor</b> (2 courses –6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of manufacturing.

### F.10 Mechanics of Materials

<b>Mechanics of Materials - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME6201	Principles of Continuum Mechanics
	ME6203	Inelastic Deformation of Solids
	ME 6769	Elasticity
	ME 7772	Fundamentals of Fracture Mechanics
	ME 7773	Advanced Fracture Mechanics
	ME 7774	Fatigue of Materials and Structures
	ME 6452	Wave propagation in solids
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course – 3 credit hours)	Suggested (one of these two):	
	MATH 6701	Math. Methods – Applied Science and Engineering
	MATH 6341	PDE

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of mechanics of materials.

### F.11 Micro and Nano Engineering

<b>Micro and Nano Engineering - Sample Program of Study</b>		
<b>Major</b> (7 courses – 21 credit hours)	ME6229	Introduction to MEMS
	ME6796	Structure Property Relations
	ME 6124	Finite Element Analysis
	ME 6460	MEMS Design
	ME 6449	Transducers
	ME6776	Microsystems Packaging
	ME6601 OR ME6304	Intro to Fluids OR Principles of Thermodynamics
<b>Minor</b> (2 courses – 6 credit hours)	Student selected minor area course	
	Student selected minor area course	
<b>Math</b> (1 course –3 credit hours)	Student selected math course	

PLEASE NOTE: These are just suggested courses. They should in no way be construed as “required.” You can mix and match. You may also replace courses with other courses in mechanical engineering, or other Schools in the College of Engineering, or applicable courses in the Colleges of Science or Computing. This template is provided merely as a general guide for a student who wants to focus heavily in the area of MicroNano Engineering.