College of Engineering and Technology
Department of Engineering

Master of Science
Biomedical Engineering

Graduate Student Handbook
2018

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WELCOME
Welcome to the graduate program in Biomedical Engineering at East Carolina University! We are delighted that you have decided to join us. You are about to embark upon a truly rewarding journey. Over the next two years, you will have many new experiences and discover unique opportunities for intellectual inquiry, camaraderie and personal growth. The challenge of graduate study may benefit from a note of caution.

By pursuing a graduate degree, you are entering a new and different phase of your academic career and intellectual development. Graduate study is not simply a continuation of your undergraduate degree, but is qualitatively different in a number of important respects. As a graduate student, you will:

- Begin a transition from being primarily a consumer of knowledge and information to being a producer of knowledge and information. This transition requires different and higher-level skills than you employed as an undergraduate.
- Be more independent. Within the requirements of the MS-BIME program, you will engage in a new course of study, academic specialization, and a research agenda. More of your time will be spent on primary research and independent scholarly activity rather than classroom assignments.
- Assume an important and active role in your courses.
- Read and write more than you ever imagined possible!

PURPOSE
This handbook is a guide to the East Carolina University (ECU) graduate program in Biomedical Engineering for Graduate Students and faculty. It is meant as a supplement to the regulations set forth by the East Carolina University Graduate School (http://www.ecu.edu/gradschool/) and should be used as a reference for program-level policies and procedures. Exceptions to the policies described herein should be made in consultation with and formal written approval by, the Graduate Program Director and the student’s research advisor. The MS Biomedical Engineering program’s graduate committee will decide whether to grant or decline the student’s petition for an exception.

CONTACTS
Department Chair  Dr. Barbara J. Muller-Borer (mullerborerb@ecu.edu)
Graduate Program Director  Dr. Barbara J. Muller-Borer (mullerborerb@ecu.edu)
Graduate Program Co-Director  Dr. Sunghan Kim (kims@ecu.edu)
IMPORTANT GRADUATE PROGRAM LINKS

- MS Biomedical Engineering
  http://www.ecu.edu/cs-cet/engineering/MSBiomedicalEngineering.cfm

- MS Biomedical Engineering Handbook (Resource tab)
  http://www.ecu.edu/cs-cet/engineering/MSBiomedicalEngineering.cfm

- MS Biomedical Forms (Resource tab)
  http://www.ecu.edu/cs-cet/engineering/MSBiomedicalEngineering.cfm

- ECU Graduate School
  http://www.ecu.edu/gradschool/

- ECU Graduate Catalog
  http://www.ecu.edu/registrar/catalog.cfm

- ECU Graduate School – Current Student Information (Graduation, Academic Support, Financial)
  http://www.ecu.edu/cs-acad/gradschool/current.cfm

- ECU Graduate School Listing of Graduate Programs
  http://www.ecu.edu/cs-acad/gradschool/Find-Your-Graduate-Program.cfm?id=396&view=program

IMPORTANT ECU LINKS

- East Carolina University
  http://www.ecu.edu/

- ECU Department of Engineering (Bookmark this page)
  http://www.ecu.edu/cs-cet/engineering/

- ECU Academic Calendars
  http://www.ecu.edu/fsonline/senate/fscalend.cfm

- ECU Registrar
  http://www.ecu.edu/registrar/

- Financial Resources, Tuition and Fees
  http://www.ecu.edu/cs-acad/gradschool/Graduate-School-Financial-Resources.cfm

- Pirate Port and Access to DegreeWorks
  https://pirateport.ecu.edu/portal/

ACADEMIC SUPPORT SERVICES & COUNSELING

- ECU’s Writing Center
  http://www.ecu.edu/cs-acad/writing/uwc/

- ECU’s Writing Center, section on Plagiarism
  http://www.ecu.edu/cs-acad/writing/uwc/

- ECU Student Handbook, section III on Academic Integrity
  http://www.ecu.edu/studenthandbook/policies.htm
• The Speech Communication Center, School of Communication  
  http://www.ecu.edu/cs-cfac/comm/center/index.cfm
• ECU Disability Support Services  
  http://www.ecu.edu/accessibility/
• ECU Center for Counseling & Development  
  http://www.ecu.edu/counselingcenter/
• Navigate Counseling Clinic  
  http://www.ecu.edu/cs-dhs/ah/clinics/navigate/index.cfm

ADMINISTRATION OF THE GRADUATE PROGRAM
The Graduate Program Director (GPD) manages the Biomedical Engineering graduate program. The Director, in consultation with the biomedical engineering core faculty, generally has decision-making power over admissions and degree requirements. The GPD reports directly to the Department of Engineering Chair and serves as the program’s representative to the ECU Graduate School.

GRADUATE PROFESSIONAL DEVELOPMENT
In addition to the formal requirements and coursework, there are numerous opportunities for professional, scholarly, and social enrichment. These include guest speakers from other universities and institutions, professional meetings and conferences, the weekly UNC/NC State Graduate Biomedical Engineering Seminar Series, Journal Clubs, the Graduate and Professional Student Senate, Graduate Student Advisory Council, informal field trips and social opportunities. These opportunities for learning and networking are an integral part of graduate training and are invaluable for professional development. While it is recognized that students have lives and responsibilities beyond ECU, it is expected that graduate students will actively contribute to the intellectual climate and scholarly culture of the program.

MS DEGREE
Specific degree requirements are set forth in the Graduate catalog for the year in which students enter the program. The MS-BIME is managed by Department of Engineering in the College of Engineering and Technology. The Biomedical Engineering degree is designed for individuals interested in the application of advanced technologies to solve complex problems in the health sciences. The educational objectives of the proposed program are to educate and train students to meet the challenges of biomedical discovery and the application of engineering principles to advance health care in eastern North Carolina. The MS-BIME prepares students to support the regional workforce in industry, healthcare, government or pursue doctoral studies in biomedical engineering or advanced professional degrees.

The degree program requires a minimum of 32 semester hours. These hours include courses in the common core made up of required courses, biomedical engineering and technical electives. Technical electives are chosen, in consultation with the student’s research advisor, from an approved list. The complete list of approved technical electives can be obtained from the Graduate Program Director.
Each student is required to engage in independent scholarly research on a topic of interest, culminating in the oral and written presentation of a thesis. The degree requires 26 hours of coursework including 14 hours of required BIME courses and 6 hours of thesis credit.

All students are strongly encouraged to actively participate in the academic process through academic output such as a professional poster, oral presentation, or journal publications highlighting their research topic. Ideally, this should be accomplished before graduation.

A. REQUIRED COURSES

The courses are designed to provide students with a solid foundation in research methods, life science, advanced mathematics and biostatistics and facilitate the preparation of a thesis proposal. All students are required to take 14 s.h. BIME courses. Courses should be chosen in consultation with the student’s research advisor.

BIME 6000 - Introduction to Biomedical Engineering Research (2 s.h.). Offered each fall. Required for all first semester graduate students.

BIME 7000 – Thesis (6 s.h.). Students register for thesis hours after their thesis proposal has been approved.

Biomedical Engineering

Four courses offered with the BIME prefix are required:

- BIME 6200 Biomedical Instrumentation/Measurements (3 s.h.)
- BIME 6250 Biomedical Signal Processing (3 s.h.)
- BIME 6300 Cardiac Electrophysiology (3 s.h.)
- BIME 6350 Cardiac Mechanics (3 s.h.)
- BIME 6400 Biomaterials (3 s.h.)
- BIME 6450 Biomolecular Engineering (3 s.h.)
- BIME 6500 Tissue Engineering (3 s.h.)
- BIME 6700 Selected Topics in Biomedical Engineering (3 s.h.)
- BIME 6700 Selected Topics in Biomedical Engineering – Numerical Methods (3 s.h.)

Biomedical Engineering courses are typically offered either fall or spring, every other year. Please check the Graduate Catalog and Pirate Port for course offerings.

One Life Science course

- PHYL 6330 Human Physiology (5 s.h.)
- PHLY 7702 Graduate Cellular Physiology (5 s.h.)
- BIOL 6071 Human Gross Anatomy (4 s.h.)
- BIOL 6300 Neurophysiology (3 s.h.)
- BIOL 7480/7481 Cell Biology/Cell Biology Laboratory (4 s.h.)
- KINE 6208 Cardiopulmonary Physiology (3 s.h.)

One Biostatistics course

- BIOS 7021 Biostatistics for Health Professionals (I) (3 s.h.)
• BIOS 7501 Experimental Design (3 s.h.)
• MATH 5031 Applied Statistical Analysis (3 s.h.)
• MATH 5801 Probability Theory (3 s.h.)
• PHAR 7777 Biometry (3 s.h.)

One Advanced Mathematics course
• MATH 5101 Advanced Calculus I (3 s.h.)
• MATH 5102 Advanced Calculus II (3 s.h.)
• MATH 5110 Elementary Complex Variables (3 s.h.)
• MATH 5121 Numerical Analysis in One Variable (3 s.h.)
• MATH 6401 Introduction to Partial Differential Equations I (3 s.h.)
• MATH 6411 Ordinary Differential Equations I (3 s.h.)
• PHYS 5311 Mathematical Physics (3 s.h.)

One Technical Elective
Students are encouraged to select courses that combine to form a coherent program of study. Approved technical electives include:
• BIME 6200 – 6700
• KINE 6803 Special Topics in Neuromotor Control
• KINE 7200 Biomechanics (3 s.h.)
• PHYS 6715 Biomedical Physics (3 s.h.)
• PHYS 6720 Physics of Medical Imaging (3 s.h.)
• PHYS 7715 Biomedical Optics (3 s.h.)
• BIOC 7301 Biochemistry 1 (4 s.h.)
• BIOL 7880, 7781 Bioinformatics (3 s.h.)
• CHEM 7522 – Current Good Manufacturing Practices (3 s.h.)
Please check the Graduate Catalog and Pirate Port for course offerings per semester.

### Table 1 - Typical 2 Year Program*

<table>
<thead>
<tr>
<th>Semester 1 (Y1) – Fall</th>
<th>Semester 2 (Y1) – Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>- BIME 6000 - Intro to Biomedical Engineering Research</td>
<td>- BIME 6200 - Biomedical Instrumentation/Measurements</td>
</tr>
<tr>
<td>- BIME 6400 Biomaterials</td>
<td>- BIME 6500 - Introduction to Tissue Engineering</td>
</tr>
<tr>
<td>- Biostatistics</td>
<td>- Technical Elective, Biostatistics or Math</td>
</tr>
<tr>
<td>- Math</td>
<td></td>
</tr>
<tr>
<td>- Life Science (most Life Science courses are offered in the fall semester)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester 3 (Y2) – Fall</th>
<th>Semester 4 (Y2) – Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>- BIME 6250 - Biomedical Signal Processing</td>
<td>- BIME 6300 - Cardiac Electrophysiology</td>
</tr>
<tr>
<td>- BIME 6350 - Cardiovascular Biomechanics</td>
<td>- BIME 6450 - Biomolecular Engineering</td>
</tr>
<tr>
<td>- Technical Elective, Biostatistics or Math or Life Science</td>
<td>- Technical Elective, Biostatistics or Math</td>
</tr>
<tr>
<td>- BIME 7000 Thesis hours</td>
<td>- BIME 7000 Thesis hours</td>
</tr>
</tbody>
</table>

* Use Pirate Port and Degree Works to map individual course plan

Building on the research strengths of the affiliated ECU schools and colleges students may opt to focus their studies in one of the following areas:

- **Cardiovascular Biomedical Engineering**
  - BIME 6350 (Cardiovascular Mechanics)
  - BIME 6300 (Cardiovascular Electrophysiology)
  - BIME 6200 (Biomedical Instrumentation)
  - BIME 6250 (Biomedical Signal Processing)

- **Biomolecular & Tissue Engineering**
  - BIME 6500 (Introduction to Tissue Engineering)
  - BIME 6450 (Biomolecular Engineering)
  - BIME 6400 (Biomaterials)
  - BIME 6200 (Biomedical Instrumentation)
• Biosensors and Biosignals
  ○ BIME 6200 (Biomedical Instrumentation)
  ○ BIME 6250 (Biomedical Signal Processing)
  ○ BIME 6300 (Cardiovascular Electrophysiology)

B. COURSEWORK AND GRADE POLICIES

Course Schedule
The typical course load is three courses, or 9 hours, per semester. In some cases, 12 or up to 15 hours may be taken, although this is discouraged. A graduate student is considered full-time if they are registered for 9 or more hours in a given semester. An exception is made for thesis students in the last semester of their program. A student registered for BIME 7000, (3 or 6 credit hours), is considered by the registrar to be a full-time student and eligible to continue on assistantship. A student must be registered for at least 5 hours to be considered half-time, the threshold to delay repayment of student loans.

Advising
All course selections must be approved by the student’s academic/research advisor. The Graduate Program Director will serve initially as temporary advisor. Students should select a permanent advisor before the beginning of their second semester. Advisors must be members of the graduate faculty. Students may change their advisor upon mutual agreement between the student, the new advisor and the Graduate Program Director. It should be noted that as a professional courtesy, students are expected to discuss this change in advisor with their former advisor and the Graduate Program Director before a final change occurs.

Thesis Credit
BIME 7000 (Thesis) is a required 6-hour course. It is designed to provide students with the time necessary to work toward completion of the thesis, generally in the second year.

Thesis courses are graded satisfactory/unsatisfactory. A grade of ‘S’ (satisfactory-progress) or “U” (unsatisfactory progress) will be assigned by the registrar until all requirements for the degree have been met, including the successful defense of the thesis. The grade of S will denote satisfactory progress in research; credit hours will be included in attempted and earned hours. The grade of U will denote unsatisfactory progress in research; credits will not be earned but credit hours will be included in attempted hours. After successful defense of the thesis and approval by the Graduate Dean, the grade of R will be assigned by the Registrar’s Office upon receipt of the Thesis Acknowledgement Form from the Graduate School. Grades of S, U, and R will carry no quality points and will not be included in the calculation of grade point averages.

Grade Policies and Incompletes
According to ECU Graduate School Policy, students receiving a grade of C or F in courses totaling more than 6 hours will have their program terminated. In addition, students must maintain an average grade of ‘B’ or risk having their program terminated.
If a student receives a grade of ‘Incomplete’ for any course, they are given one year to complete the coursework. After one year any grade of I will automatically become an F. It is the student’s responsibility to ensure that a ‘Change of Grade’ form is submitted by the appropriate faculty member once an Incomplete has been resolved.

C. PROGRAM STEPS AND MILESTONES

Graduate Students are advised to adhere to the schedule below if they plan to complete the program in two years. Meeting the milestones listed below and summarized in Tables 2 is considered “satisfactory progress” toward completion of the degree. Failure to meet the milestones can jeopardize financial aid. It is the responsibility of the student (not the advisor) to see that any necessary paperwork is completed at the appropriate time.

Note that, according to graduate school policy, any course taken more than six years ago may not count toward a degree. That is, students who do not complete their program in six years will be required to repeat coursework in order to receive their degree.

Table 2 - Summary and Checklist of Graduate Program Milestones

| First semester | • Courses to enroll: BIME 6000, one BIME 6000 level course, Life Science, Mathematics or Biostatistics (5000 – 6000 level)  
|                | • Identify advisor and thesis topic  
|                | • Request final undergraduate transcript(s) sent to admissions  
| Second Semester | • Courses to enroll: Two BIME 6000 level courses (or one BIME and one technical elective), Biostatistics or Mathematics  
|                | • Assemble thesis committee (2 engineering faculty, 1 faculty outside of the Department of Engineering)  
|                | • Write and defend thesis proposal  
| Summer | Begin work on thesis research  
| Third Semester | • Courses to enroll: Two BIME 6000 level courses (or one BIME and one technical elective), BIME 7000  
|             | • Begin writing thesis  
|             | • Submit Graduate Application form  
| Fourth Semester | • Courses to enroll: BIME 7000, One BIME 6000 level course or technical elective  
|             | • Finish writing thesis  
|             | • Schedule defense  
|             | • Defend thesis  
|             | • Submit electronic thesis to Graduate School by published deadline  
|             | • Follow Graduate School guidelines for electronic submission of thesis  
|             | [http://www.ecu.edu/cs-acad/gradschool/current.cfm](http://www.ecu.edu/cs-acad/gradschool/current.cfm)
First Year Milestones

*Thesis Committee*

The thesis committee consists of an advisor (the committee chairperson) and two additional faculty members. No more than two committee members may be from the same department on campus, i.e., the committee should be composed of two Department of Engineering faculty and one faculty member from outside the Department of Engineering. Additional members, formal or informal, may be added to any committee by mutual agreement between student and advisor.

*Thesis Proposal*

Students writing a thesis will develop a written proposal by the end of their first year, and give an oral presentation of the proposal to faculty and students. The advisor has discretion over the length and format of the document, but in general the proposal should include a review of the relevant literature, and clearly describe the research questions, theoretical framework, methodology and expected outcomes of the thesis. Copies of the proposal will be distributed to the advisor and committee members at least two weeks prior to the oral presentation of the proposal.

The proposal defense will take place at the end of the student’s second semester. The defense will begin with a presentation by the student of approximately 30 - 45 minutes, followed by questions from the thesis committee. The student’s advisor and committee members will confer and vote pass or fail on the proposal. If the outcome of the vote is not unanimous, the student’s committee will decide upon additional requirements. The advisor will submit a written pass/fail evaluation of the proposal to the Graduate Program Director soon after the presentation. An evaluation rubric is used for assessment. See Appendix for “Proposal Evaluation Rubric”.

*Thesis Topic Approval Form*

Students will submit a “Pre-Thesis or -Dissertation Research Approval Form” (see Appendix) normally at the end of the second semester after a topic has been identified, the committee has been formed and the proposal has been successfully defended. The form should be filled out by the student, signed by the advisor and the Graduate Program Director, and submitted to the Graduate Program Director before submission to the Graduate School. See Appendix for “Pre-Thesis or Dissertation Research Approval Form”.

Second Year Milestones

*Graduate Application for Graduation*

This form is available from the Graduate School or Registrar’s Office and must be filled out by the student the semester prior to that in which he/she plans to graduate. Submission of the form will normally occur at the end of the student’s third semester. Students should meet with their academic advisor before submitting Graduate Application. At the time of application, students will be required by the graduate school to complete an on-line graduate student exit survey.

*The Thesis*

The M.S. thesis should represent a substantial piece of original, innovative research and must show the linkage and integration of biomedical engineering to the research topic. Guidelines for preparation and presentation of thesis texts are available from the Graduate School.

http://libguides.ecu.edu/c.php?g=694874&p=4925841
The student and advisor should agree in advance on a referencing style. Normally, the student and advisor consult until the advisor feels the thesis draft is of sufficient quality to be reviewed by the committee. The draft is then submitted to the entire committee. The committee may elect to require further work or modifications, or determine that the thesis is ready to defend.

All students are strongly encouraged to participate in the academic process through academic output such as a professional poster, oral presentation, or journal publication highlighting their research topic. Ideally, this should be accomplished before graduation.

**Timing and Scheduling of the Thesis Defense**

The **Thesis Defense** - When the committee determines that the thesis is ready to defend, a date is set. As a matter of courtesy, students should allow committee members **at least two weeks** to evaluate the draft thesis. **It is the responsibility of the student to publicize the date and reserve a room for the defense by making arrangements with the department secretary.**

**Graduation Schedules** - **Students wishing to graduate in the spring semester usually face a mid-April deadline for successfully defending and submitting their thesis (see the current Graduate School Academic Calendar for the exact dates, [http://libguides.ecu.edu/vireo/etd](http://libguides.ecu.edu/vireo/etd).** To meet a spring deadline, students are strongly advised to complete a final draft of their thesis no later than March 15, in order to ensure sufficient time for edits and revisions.

Students who are registered in the Spring Semester but do not finish their degree requirements may graduate in the summer without re-registering or paying tuition. **Please note however, that faculty members are frequently unavailable during summer months.** Students should not expect to receive significant input from their advisor or committees and will likely have to work around busy schedules. For a summer graduation, the deadline for the successful defense and submission of the thesis is mid-July. To meet a Summer Session deadline, students are strongly advised to complete a final draft of their thesis no later than June 15, in order to ensure sufficient time for edits and revisions.

Students anticipating a defense or completion at other times of the year should consult the current **Academic Calendar** for deadlines. **If a student has accumulated sufficient hours for their degree, they no longer need to register for classes while finishing a thesis.** An inactive student, however, must apply for readmission to the graduate school, and must be registered for at least **one credit hour** during the semester in which they intend to graduate.

Only students who have **successfully defended** their thesis project will be allowed to walk and be hooded during commencement (spring or fall). Please contact the Graduate Program Director if you intend to walk and be hooded at commencement. **Students who fail to confirm and/or communicate completion of MS requirements with the Graduate Program Director will not be recognized during the graduation ceremony.**
The Thesis Defense
The thesis defense represents the final assessment of the student’s knowledge in his or her area of expertise and the quality of the research project. This defense will normally take place in the student’s fourth semester. Students should allow at least two weeks advance notice, so that the thesis committee will have an adequate opportunity to review the manuscript. The defense should be well publicized and all College of Engineering and Technology faculty, graduate and undergraduate students invited to attend. It is the responsibility of the student to publicize the date and reserve a room for the defense by making arrangements with the department secretary.

The thesis defense will begin with a 30-45 minute presentation by the student, highlighting the major findings and implications of the thesis research. Following a brief question-and-answer period, the committee will meet in closed session with the candidate for the formal defense. The committee may ask questions about the research documented in the thesis and further assess the student’s knowledge in the area of expertise. After the committee’s questioning period, the committee will determine whether the student has passed or failed. Students passing the defense should expect that they will have to make additional changes to the thesis to remedy deficiencies identified by the committee. Students failing the defense should work with their committee to correct problems and schedule a future defense. See Appendix for “Written Thesis Evaluation Rubric” and “Oral Presentation Evaluation Rubric “

Only students who have successfully defended their thesis project will be allowed to walk and be hooded during commencement (spring or fall). Please contact the Graduate Program Director if you intend to walk and be hooded at commencement.

Electronic Submission of Thesis
The Graduate School has strict guidelines governing the formatting of any ECU thesis and requires submission of electronic theses. Students should consult the Graduate School’s website http://libguides.ecu.edu/vireo/etd for details. Upon completion of all required revisions, the student must print out the thesis ‘signature page’ and have it signed by the student’s advisor, committee and the program chairperson.

Students are required to submit a final bound copy of the thesis to the Graduate Program Director after the thesis signature page has been given to the Graduate School and the electronic thesis submission is complete.

D. DEPARTMENTAL ASSISTANTSHIPS
Departmental assistantships are awarded on a competitive basis, and provide modest stipends to students in exchange for employment. The number and dollar value of assistantships are dependent upon both levels of funding and the nature of the student applicant pool, and may vary from year to year. Generally, there are two types of funding. Graduate Assistantships (GAs) are funded by the ECU Graduate School and allocated by the Graduate Program Director. Teaching Assistantships
(TAs) are funded by the Department of Engineering and are awarded in consultation with the Graduate Program Director and the Department of Engineering Chair. Assistantships are awarded on a semester-by-semester basis. **Continued funding is contingent upon both satisfactory progress toward the degree (i.e. minimum 3.0 GPA) and acceptable performance of assistantship duties.** Students are not typically funded for more than four semesters.

TA positions are funded through the Department of Engineering. These positions are often advertised by faculty and can be found on the ECU people admin webpage [https://ecu.peopleadmin.com/applicants/jsp/shared/Welcome_css.jsp](https://ecu.peopleadmin.com/applicants/jsp/shared/Welcome_css.jsp) (i.e. Student Positions).

**Duties, Responsibilities, and Evaluations**
The typical Graduate Assistant works 15 - 20 hours per week depending on funding level. Assistants are responsible for doing their jobs during all times school is in session, regardless of the demands placed on them by course or thesis work and generally involve employment under the supervision of one or more faculty members. GA’s are expected to meet with their faculty supervisor at the beginning of each semester to set up a work schedule, and should check in frequently throughout the semester. Graduate Assistants will be evaluated at the end of each semester, and poor performance may result in the discontinuation of funding. All GA’s are expected to arrange their schedules and attend the weekly UNC/NC State Graduate Biomedical Engineering noon seminars each semester.

**E. NON-RESIDENT TUITION ASSISTANCE**
The Department of Engineering awards a limited number of non-resident tuition assistantships to individual students on a competitive basis. Students receiving non-resident tuition assistance pay tuition at the rate of a North Carolina resident. **Funding is contingent upon satisfactory progress toward the degree (i.e. minimum 3.0 GPA).** Assistance will not automatically be renewed for a second year, and **students are strongly encouraged to take the necessary steps to secure North Carolina residency by the beginning of their second year.** Students receiving non-resident tuition assistance who leave their assistantship or drop courses will be responsible for re-paying their remissions in full. Non-resident tuition assistance may not be used to pay for distance education courses.

**F. NORTH CAROLINA RESIDENCY**
Non-resident students who are US citizens may qualify for North Carolina residency (and thus in-state tuition rates) after one year if certain conditions are met. Information about the requirements and application procedures for residency can be found at the graduate school web site. [http://www.ecu.edu/cs-acad/gradschool/Residency.cfm](http://www.ecu.edu/cs-acad/gradschool/Residency.cfm)

**G. TRAVEL**
All students are strongly encouraged to participate in the academic process through academic output such as a professional poster and oral presentations and conference attendance. The Department of Engineering supports student travel, however, student travel funding is extremely limited. Travel request forms should be completed and submitted to the student travel review committee at least TWO WEEKS BEFORE you need to complete registration or make any reservations for the event you are proposing to attend. Ideally, you will submit this form before submitting an abstract to a conference. A letter of support from your faculty advisor must
accompany this form. Travel forms and instructions to request funding are included in the Appendix.

H. DESKS, OFFICES AND LABS
The Department of Engineering has a limited amount of graduate student office space. Priority will be given to students receiving assistantships. Desks and offices are intended to be active work spaces, not storage closets or social areas. Students who are not making appropriate use of their office space will have their desk reassigned to another student.

Please endeavor to keep program and Department facilities neat and clean. Use of Department equipment is limited to work-related activities, and students should refrain from using computers or printers for personal use.

I. LAB SAFETY TRAINING
East Carolina University’s policy is “All lab users – staff, students, and faculty – must have lab safety training prior to using the lab.” To complete the lab safety training go to the College of Engineering’s Lab Website:
https://collab.ecu.edu/sites/engtechlabs/default.aspx

To find the appropriate training module, click on your lab room number, and select “Safety Training Module Link”. Open LAB SAFETY TRAINING folder, select the VIDEOS FOLDER for modules. If you need an attendance form or blank quiz, open the FORMS FOLDER. Print the quiz answer sheet for the appropriate module or see a lab supervisor, 238 Science & Tech for a blank form. Submit completed quiz to Chad Spruill, 238 Science & Tech.

J. AFFILIATE FACULTY
Affiliate faculty are those faculty who share an interest in biomedical engineering applications and research activities in conjunction with the MS program, serve as thesis advisors and members, and mentor students working on related research. They represent degree programs, departments and disciplines including the Brody School of Medicine, the School of Dental Medicine, College of Nursing, College of Allied Health Sciences, Thomas Harriot College of Arts and Sciences, and the College of Health and Human Performance.

BEFORE YOU LEAVE
Students are reminded to please turn in all keys and fill out an Alumni Contact Sheet at the time of graduation. We wish you well – please keep in touch!
Pre-Thesis or -Dissertation Research Approval Form

Before beginning thesis or dissertation research, this check list should be completed by the master’s or doctoral candidate in conjunction with the thesis or dissertation director. Please NOTE: All thesis and dissertation research must be approved by the thesis or dissertation director and the Unit Graduate Program Director. All students whose thesis or dissertation projects involve human subjects must have their proposed research approved by the University and Medical Center Institutional Review Board (UMCIRB) before beginning the studies involving those subjects. Likewise, all students whose projects involve animals must have their proposed research approved by the Institutional Animal Care and Use Committee (IACUC) before beginning those studies. A copy of the appropriate approval must be submitted with this form, or with an updated form when it is known that the research requires the involvement of such subjects, and must be included in the Appendix of the completed thesis or dissertation.

Date ___________                      Banner ID ____________________

Student name, phone number, and email address:
__________________________________________________________________________________________________
__________________________________________________________________________________________________

Working Title of Thesis or Dissertation Research:

__________________________________________________________________________________________________

___ Have you selected an appropriate director for your master’s or doctoral work?
Name________________________________________

___ Have you selected an appropriate committee for your master’s or doctoral work?
If so, please list:
1. _________________________   2. ___________________________
3. _________________________   4. ___________________________

___ Has your proposed research been reviewed and approved by your director?

___ Does your research involve human subjects?
   ___ Has it been approved by the UMCIRB?
       If not, when will it be reviewed for approval? __________

___ Does your research involve animals?
   ___ Has it been approved by the IACUC?
       If not, when will it be reviewed for approval? __________

___ Does your research involve potential biohazards such as recumbent DNA, viral vectors, infectious agents, human blood products etc.?
   ___ Has it been approved by the Biosafety Committee?
       If not, when will it be reviewed for approval? __________

**Approvals:**

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<th>Thesis or Dissertation Director Signature</th>
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<th>Program Director Signature</th>
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**Acknowledgement of Receipt by Graduate School:**

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<th>Dean of the Graduate School or designee</th>
<th>Date</th>
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# EVALUATION RUBRIC: MS THESIS PROPOSAL

**Student Name:** ________________________________  
**MS Program:** ________________________________  

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<tr>
<td>1. Described goals in pursuing this research project</td>
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<td>2. Described a research problem suitable for study</td>
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<td>3. Demonstrates a knowledge of the literature relevant to their research problem</td>
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<td>4. Demonstrates an understanding of the potential significance of the resolving the problem within the context of their field of study</td>
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<td>5. Shows an understanding of how to use research methods/tools effectively, and how to apply them to solve their research problem</td>
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<td>6. Provides a plan for analyzing/interpreting the research data</td>
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<td>7. Communicates research proposal clearly and professionally.</td>
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<td>8. Proposed project demonstrates potential to advance knowledge and understanding within its own field or across different fields</td>
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<td>9. Proposed project demonstrates potential to benefit society or advance desired societal outcomes</td>
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**Total Score**___________________

Please include comments on back of sheet

**COMMITTEE MEMBER SIGNATURE** ______________________________________________

**DATE** ____________________________
MS Biomedical Engineering
Written Thesis
Evaluation for Assessment

1. Content:

Introduction: Review of literature adequate, introduction identifies the pertinence to the field of study; research objectives clearly stated, hypothesis(es) and/or experimental approach(es) logical and concisely stated. 20 points

Materials and methods: Experimental procedures well described; appropriate controls clearly identified 1 5 points

Results: Data appropriate, sufficient, and analyzed correctly. Data adequately support the conclusions 15 points

Discussion: Conclusions/interpretations sound and related to representative literature. Future research directions and questions are presented. 20 points

2. Presentation:

Tables: Necessary, concise, accurate, functionally well laid out 5 points

Figures: Necessary, effective in conveying information, sufficiently high technical quality 5 points

Writing style: Grammatically correct, clear, concise 15 points

Formatting: Complies the “Manual of Basic Formatting Requirements for Theses and Dissertations” as defined by ECU's Graduate School. 5 points

Total points (out of 100) ______

90-100 points: Excellent, Demonstrates and communicates a thorough command of the subject matter and context. Communication skills and level of professionalism are strong, indicating a readiness to produce publishable academic products.

80-89 points: Good, Demonstrates and communicates a satisfactory command of the subject matter and context. Communication skills and level of professionalism are satisfactory, indicating ability to produce publishable academic products.

70-79 points: Fair, Demonstrates and communicates a below average command of the subject matter and context. Communication skills and level of professionalism are mediocre.

<70 points: Poor, Fails to demonstrate and communicate a command of the subject matter and context. Communication skills and level of professionalism are in adequate.

Student name: _____________________________________

Faculty reviewer: _____________________________________

Date: ____________
## MS Biomedical Engineering
### Seminar
#### Evaluation for Assessment

1. **Content:**

   - **Conceptual Background:** Introduction, problem statement presented. 10 points ___
   - **Objectives/Hypothesis:** Purpose of study clearly stated. 10 points ___
   - **Materials & Methods:** Described clearly, with adequate information. 10 points ___
   - **Results:** Analysis appropriate and adequate, interpretation valid 10 points ___
   - **Discussion:** Includes speculation and suggestions for future directions 10 points ___
   - **Summary:** Conclusions and discussion of how results advance the field and relate to other fields. 10 points ___

2. **Graphics:** Slides/handouts/transparencies legible. 10 points ___

3. **Speaking style:** Poised, well-prepared, communicates well. 15 points ___

4. **Questions:** Replied to questions satisfactorily and professionally 15 points ___

**Total points (out of 100) ______**

**90-100 points:** Excellent, Demonstrates and communicates a thorough command of the subject matter and context.

**80-89 points:** Good, Demonstrates and communicates a satisfactory command of the subject matter and context.

**70-79 points:** Fair, Demonstrates and communicates a below average command of the subject matter and context.

**<70 points:** Poor, Fails to demonstrate and communicate a command of the subject matter and context.

**Student name:** ________________________________

**Faculty reviewer:** ________________________________

**Date:** ____________
Instructions:

This form should be completed and submitted to the student travel review committee at least TWO WEEKS BEFORE you need to complete registration or make any reservations for the event you are proposing to attend. Ideally, you will submit this form before submitting an abstract to a conference. A letter of support from your faculty advisor must accompany this form.

Currently the student travel review committee members are Dr. Barbara Muller-Borer and Ms. Blair Weaver. Submit your completed packet to weaverel16@ecu.edu.

As a general rule, you should not pre-pay for any reservations (hotel, airfare, event registration) until the travel has been approved by the student travel committee and then entered and approved in Pirate Port.

This application packet must be complete, including all supporting documentation, before the travel committee will review the travel request.

Overview of the student travel process:

1. Identify the event type. (This is critical in determining the level of support you will receive.)
2. Prepare student travel request application packet.
3. Submit complete packet to student travel committee.
4. Receive notification from student travel committee.
5. Watch for and sign the ECU travel system pre-travel approval request through Pirate Port (This notification comes to your ECU email address).
6. Attend event. (Save registration receipts, proof of attendance, proof of travel (boarding passes), hotel receipt showing number of occupants and zero balance. Food is per diem so receipts are not required. Use the travel envelope provided.)
7. Submit travel envelope to Becky Foster for reimbursement.
8. Watch for and sign ECU travel system approval request through Pirate Port.
9. Submit trip report to travel committee and/or faculty advisor.

Only after pre-approval is complete in Pirate Port, event registration and air/train tickets may be paid for with the departmental purchasing card by making an appointment with Becky Foster. Hotel costs may not be prepaid. Bring the relevant website links, flight numbers, etc. to that appointment to expedite the process of purchasing allowed pre-travel expenses.
East Carolina University Student Travel Request Form

Department of Engineering

**Student Travel Categories and Funding Sources:**

Student travel funding is extremely limited, so the type of travel and allowable source of the funds will affect the amount of support and the prioritization of requests.

**TRAVEL FUNDING SOURCES**

Generally, the funding source may be

1. State operating funds
2. ECU Foundation funds
3. Individual grants

**TRAVEL PURPOSE CATEGORIES**

Typical travel purposes include:

- Presenting author of a research poster or presentation.
- Contributing author (but not presenting author) on a research poster or presentation.
- Travel for training (For example, bioprocess student chromatography training).
- Attendance at a national professional organization meeting as a national student organization office holder. (For example, an ECU student is national secretary for the student division of NSBE)
- Attendance at a national meeting of a student organization as a local organization office holder. (For example, the ECU TBP chapter president attends the national TBP meeting).
- Attendance at a regional or national student organization meeting.
- Attendance at a regional or national professional organization meeting.
- Participation in a competition hosted by a professional society (Human-powered bicycle team, SAE Aero, etc.)
- Travel for research (field studies).

Presenting or contributing authors may be supported with state funds or grant funds. If your request includes grant funding, work with your faculty advisor to include the correct fund numbers/grant names. Competitions and regular conference attendance (without presenting) must be funded from the more limited foundation funds.
East Carolina University Student Travel Request Form
Department of Engineering
ECU Engineering Student Travel Request Cover Sheet

Today’s date:    Student Name:    Student Banner ID:

Faculty Advisor’s name:

Proposed travel dates:

Travel destination:

Travel Purpose Category (see above instructions)

Prior Support: Please indicate amount, purpose, and dates of any previous departmental support of travel.

Attachment Checklist

This application packet should be compiled as a single stack of unstapled paper or a single .pdf document with this sheet as the cover page.

A complete packet includes

- Completed student travel cover sheet (Next page).
- A completed student travel budget sheet. (Use the Excel calculator and print out summary table)
- Printout of event information (must include dates, location, organization. May be printed from web page)
- Supporting documentation for EACH budget line item as appropriate
- Mileage (Printout of mapquest.com)
- Airfare (printout of Travelocity quote or similar)
- Event registration (email or printout of website)
- Proof of abstract acceptance (Presenting or contributing authors must have abstract acceptance email or copy of program indicating inclusion of the submitted work to be supported with state funds.)
- Faculty letter of support
- Justification statement. In 400 words or less, provide justification for departmental support of your proposed travel.