



# 2016-17 Graduate Student Handbook



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## Introduction

The Department of Bioengineering is a component of the College of Engineering, Computing and Applied Sciences and was originally created to promote inter-departmental cooperation in research and graduate training. Students and faculty from other departments whose interests are closely allied to bioengineering also participate actively in the program of the department. Graduate students in bioengineering are encouraged to interact with these allied programs in order to broaden their research and academic experience.

This manual has been prepared to acquaint students with the basic policies and operating procedures of the Department and to call attention to the more important rules and regulations of the University which apply to graduate students. The Graduate School sets the basic policy for all graduate programs and is responsible for final decisions in policy matters. You can access the Graduate School Policy Handbook using this link: [http://www.clemson.edu/graduate/files/pdfs/g\\_s\\_policy\\_handbook.pdf](http://www.clemson.edu/graduate/files/pdfs/g_s_policy_handbook.pdf). This should be followed, where necessary, by discussions with your faculty advisor and with the Department Chair. Exceptional cases will be referred to the office of the Graduate Dean.

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# Academic Regulations

## Bioengineering Department Entrance Requirements

The basic requirement for admission to an advanced degree program in bioengineering is a bachelor's degree from an accredited undergraduate engineering program. Students will most commonly be trained in materials, chemical, mechanical, or electrical engineering, although students from the other traditional engineering disciplines are also accepted. Exceptional students in physics, chemistry and the life sciences are also considered.

Because of the interdisciplinary character of bioengineering, it is to be expected that many students will have areas of deficiency that will have to be remedied during their first year of graduate work. The following is a list of courses that cover the areas in which all bioengineering graduate students must demonstrate competence:

- A. Students with a bachelor of science degree in engineering or physics should present a minimum background of:
  - 1) One course in organic chemistry or biochemistry.
  - 2) One course in either basic cell biology or introductory physiology including a laboratory experience.
  
- B. Students with a bachelor of science degree with majors such as biology, physiology, microbiology, zoology, or biochemistry must present the background required of engineers, plus the following:
  - 1) Calculus of Severable Variables (MATH 2060)
  - 2) Introduction to Ordinary Differential Equations (MATH 2080)
  - 3) Engineering Mechanics: Statics (CE 2010)
  - 4) Introduction to Materials Science (MSE 2100) OR Basic Electrical Engineering (ECE 3070)
  - 5) Additional junior-level engineering course – e.g., Biomechanics, Biofluid Mechanics, Bioinstrumentation, Thermodynamics, Transport
  
- C. Students may enter the Bioengineering Department prior to meeting all the prerequisites if approved by the admissions committee. These students must plan to complete the prerequisites during their enrollment in the department in addition to the requirements stipulated for the Master of Science or Doctor of Philosophy degree in Bioengineering. It should be noted that course credits from prerequisites are not applied toward a graduate degree and students may be restricted to a minimum assistantship until undergraduate pre-requisites are completed.

- D. Under special circumstances, some students may wish to waive prerequisites. A petition to the Bioengineering Department must be submitted.
- E. Students are encouraged to pursue a core plan of study as defined in their Plan of Study (GS2 form). Please refer to each degree program requirements for departmental degree requirements.
- F. Credit for undergraduate courses cannot be applied toward a graduate degree; however, a semester grade of at least a "B" must be achieved to satisfy a deficiency requirement. A "C" grade will be subject to review by the student's advisor in consultation with the faculty. If a graduate student receives a grade of "D" or lower in an undergraduate course, he or she must repeat the course and such a repetition will be allowed only once during the student's graduate program.

### **Academic Standing**

A graduate student must maintain a minimum overall average of "B" for all courses taken. If at any time a student fails to satisfy this requirement, s/he is automatically placed on probation for one semester during which time s/he is not eligible for financial aid. A graduate student is permitted only one probationary semester during the entire course of her/his graduate program. In addition, a failing grade (D or F) in a course in the area of the student's major may be cause for dismissal regardless of the student's average.

### **Course Load**

By University policy, full time status is defined as being enrolled in 9 credit hours in fall and spring; and 6 credit hours in the long summer session.

### **Communication Skills**

The ability to communicate ideas accurately and effectively is indispensable to any field of technical endeavor and every candidate for an advanced degree in bioengineering must demonstrate a high level of competence in this art. These communication skills must include verbal presentation, both oral and written, and graphic display, e.g. slides, movies, models, charts, drawings, etc.

A minimum exposure to public speaking will be provided by the required Graduate Seminar, see below. Further speaking experience will be gained by making periodic presentations to the thesis committee and in the final thesis defense. Additional speaking experiences, especially at technical society meetings, should be actively pursued and are encouraged by the Department.

Similarly, preparation of term papers and collaboration with your advisor in report writing will provide experience in technical writing. The principal writing experience, however, will be the preparation of the thesis or report.

## **Clinical Internship**

The Bioengineering Department offers a clinical internship course to expose Clemson University graduate students to bioengineering in the clinical arena. In general, engineers in industry solving medical problems are of two basic types -- those involved in the development of a health care technology, and those involved in the practical application of this technology. Both types of activity require that the individual have a working understanding of the state of the art of the medical industry, and an appreciation for its immediate and long term needs. The clinical internship provides time so that the course material and laboratory experiences provided in the classroom setting may be assimilated with applications learned from the clinical internship. Internships can be pursued at a clinical or industrial site providing approval by the advisor and the advisory committee, and a written statement from a preceptor at the internship site describing the scope of the internship and activities to which the intern will participate. This information is provided to the instructor of record for BIOE 8900. As BIOE 8900 is a variable credit course, students must discuss with the course instructor and their advisor before registering for credits.

## **Graduate Seminar**

The Seminar in Bioengineering (BIOE 8000) provides a forum during the fall and spring semesters for presentation and discussion of student conducted research. This course is designed to simulate professional presentation at a national scientific meeting and other professional venues. All students enrolled in bioengineering and those whose research advisor is a faculty of the Department of Bioengineering are required to attend on a regular basis and to present a seminar concerning their individual research project or some related subject annually. Exceptions to the attendance rule will have to be negotiated on an individual basis with the department chair and approved by their advisor. Registration and attendance in BIOE 8000 is a requirement for BIOE degree candidates. An attendance policy will be announced at the beginning of each semester and satisfactory attendance is required for enrolled students to remain in good academic standing.

## **Laboratory Notebooks**

Following verification with advisor, each student involved in research should obtain a laboratory notebook at the inception of his/her research program. All research activities are to be recorded either in notebook or other media approved by advisor. At the termination of the student's affiliation with the department, the notebook and all recording media must be submitted to the faculty advisor as well as electronic version of all research materials generated during the degree progress. The notebook and all research materials that have accumulated during the research period including charts, specimens, photographic materials or instruments remains the property of the department. The copy becomes the property of the student. The real value of the complete and detailed laboratory notebook can only be appreciated at the end of a research program, when the thesis, journal paper, or final report must be prepared. Maintenance of the laboratory notebook will be an important consideration in assessing a student's progress in his/her graduate program.



## **Research Principles/Career Professional Development**

To assist graduate students acclimation to graduate school, the department teaches a one- semester course to first semester graduate students covering the principles and practices of scientific research; developing scientific concepts, developing projects, pursuing research, collaborating in multidisciplinary teams, patenting and publishing technical and scientific information, and reviewing professional and ethical standards of performance. All graduate students are required to enroll in BIOE 6150 during their first semester in residency and/or BIOE 8160. BIOE 8160 is mandatory for all incoming PhD students.

## **The Advisory Committee**

Please refer to the Graduate School Academic Regulations for policy and procedures:  
[http://www.clemson.edu/graduate/files/pdfs/GS\\_Policy\\_Handbook\\_May2015.pdf](http://www.clemson.edu/graduate/files/pdfs/GS_Policy_Handbook_May2015.pdf)

Procedure: A student must select an advisory committee in consultation with their advisor. Once advisory committee members are selected and approved, the student, department and committee members are notified of the fully constituted committee by means of the approved Plan of Study. The GS2 Plan of Study is available on IROAR to be submitted electronically to the Office of Enrolled Student Services.

A minimum of three faculty members are to be selected by a student seeking a master's thesis or non-thesis degree, and a minimum of four faculty and maximum of five members are to be selected by a student seeking a doctoral degree. The majority of the advisory committee, including the major advisor, must be comprised of Clemson University faculty who hold full-time, tenure-track positions. Either the major advisor or at least half of the committee must hold rank in the program offering the degree. If a minor is declared, this area must be represented on the committee. Emeriti faculty may serve as advisory committee members but may not serve as chair of the advisory committee. Part-time visiting and other non-tenure-track faculty employed by Clemson University may serve on the advisory committee but may not serve as chair. Persons not employed by the University may serve on the advisory committee; if they serve as one of the statutory members of the committee, they must be appointed to adjunct faculty status. All duly appointed committee members have full voting status on the outcomes of all examinations given by the committee. It is possible for co-chairs to direct the activities of the advisory committee. This special arrangement must be made with the consent of the dean of the Graduate School. Master's in biomedical engineering students are advised by the M.Eng. degree program coordinator.



## **Change of Degree Policy**

If a student decides to change their degree from Ph.D. to M.S. or M.Eng, their assistantship offer, if they have been offered one, is automatically terminated. The Change of Degree/Major form can be accessed on the Graduate School website or via IROAR. The form must be completed and approved by the appropriate departmental officials before submitting to the Graduate School for approval.

### **MS en route to Ph.D.**

Doctoral students in the Department of Bioengineering, who have successfully passed the qualifying exam and dissertation proposal, can submit the GS2-14 form (<http://www.grad.clemson.edu/forms/pdf/GS2-14.pdf>) to document the fulfillment of requirements for an 'en route' master's degree and the faculty's recommendation to award the 'en route' masters degree. The requirements for the 'master's en route' are the same as for the regular master's degree and the same university deadlines apply for students pursuing this option.

The 'en route' opportunity is only available for doctoral students who are continuously working towards the Ph.D. degree and it is not to be used as a substitute for the request for change of degree.

### **Review of Progress**

1. All M.S and Ph.D. students will be reviewed at the end of their first year and each semester thereafter to assess their potential for continuation. Advisors will monitor enrollment and course performance to ensure the student is making academic progress towards the degree.
2. At the end of two years, the student's committee will review progress. If satisfactory progress has not been made toward the M.S. or Ph.D. degree, he or she is subject to dismissal.
3. At the end of each academic semester, all students must submit to their advisor Forms I and II of the Student Evaluation System, as required following the guidelines located in the department website ([http://www.clemson.edu/cecas/departments/bioe/documents/evaluation\\_form.pdf](http://www.clemson.edu/cecas/departments/bioe/documents/evaluation_form.pdf)). No grade for BIOE 8910, 8920, 9910 will be assigned if forms are not returned before deadline for grade submission.

# Master of Engineering in Biomedical Engineering (M. Eng. In Biomedical Engineering)

## Program Objectives

The M.Eng. in Biomedical Engineering (BME) degree program provides an in-depth advanced engineering education to students who have completed a bachelor of science degree in engineering and desire to embrace an industrial career in the field of medical technology. It provides an intellectually rigorous professional graduate education that emphasizes clinical applications and biomedical engineering design, in order to better train a workforce to sustain a growing biomedical industry in South Carolina and in the United States. This program is based on core biomedical engineering, plus relevant clinical applications, providing the basis for strong technical contributions in industry. This program prepares engineering graduates for professional practice in BME and leadership roles in the biomedical science and technology private sector to help develop and sustain economic growth.

More specifically, students in the program will acquire a broad perspective of the biomedical engineering discipline that complements their undergraduate training in engineering or science, and an in-depth knowledge of an essential area in biomedical engineering. Graduates will be equipped to design biomedical devices and develop therapeutic strategies within the bounds of health care economics, the needs of patients and physicians, the regulatory environment for medical devices and pharmaceuticals, and stringent ethical standards of biomedical engineering practice. Overall, the program will graduate students who:

- Demonstrate advanced level academic expertise and practical engineering experience necessary to function as biomedical engineering professionals in a modern, ever-changing world. (**Advanced Knowledge and Life-long Learning**)
- Display competence by being selected for employment by industrial, academic or government entities or further professional/graduate studies. (**Career Opportunities**)
- Understand the broad, social, ethical and professional issues of contemporary engineering practice. (**Awareness and Responsibility**).

In order to achieve these objectives, the Master of Engineering has the following student learning outcomes (SLO) set for its graduates. All M.Eng. graduates will demonstrate:

1. An ability to apply Mathematics, Life Sciences, Physical Sciences, and Engineering to advanced biomedical engineering problems.
2. An ability in proficiently designing and validating experiments, systems, components, or processes to meet desired needs.
3. An ability for proficiently identifying, formulating, and solving advanced biomedical engineering problems.
4. An ability for proficient contemporary technical and scientific comprehension and lifelong learning.
5. An ability for proficient technical and scientific communication. (SLO5)
6. An ability to use advanced techniques, skills, and modern engineering tools necessary for biomedical engineering practice.

## **Admission Criteria**

Admission to a graduate level program is controlled by the Graduate School at Clemson University. M.Eng. in BME applicants must meet the minimum requirements established by the University for admission to a graduate program. In addition, individuals with the following qualifications will be admitted into the M.Eng. program:

- Must hold a BS degree from an ABET-accredited program (or equivalent if from an international university) in Bioengineering, biomedical engineering or other related engineering and technology discipline and must provide transcripts from the institution where the degree was obtained.
- A minimum undergraduate grade point average (GPA) of 3.0 is required for admission.
- Official GRE scores are required for admission.
- International students are required to submit TOEFL scores.
- Individuals may request a waiver of some of the above requirements (e.g., undergraduate GPA less than 3.0, or undergraduate degree not in engineering) and admission to the program if they provide sufficient evidence to the graduate program director that they have had sufficient industrial experience to warrant a waiver. It will be up to the program to accept or decline this request.

## **Curriculum**

The M.Eng. curriculum provides skills and expertise that enhance the individual's ability to contribute to the technical workforce. The degree will provide professionals in the technical workforce an opportunity to continue their education and development in the context of an advanced degree. The M.Eng. also serves the practicing engineer to further his/her career in the context of an application of engineering knowledge, as opposed to a master's of science in a research context, which is focused on discovering new knowledge.

The minimum requirement for this degree is one year of full-time graduate study, or its equivalent. Eligibility for graduation requires a minimum of thirty (30) graduate credits from a mandatory core and technical elective courses. No thesis is required for this degree. A student who has previous graduate work at another institution that has not been used towards a degree may petition the Graduate Committee to transfer up to nine (9) semester credit hours of relevant course work with grades of 'B' or better.

### **Mandatory Core:**

BIOE 8130 - Industrial Bioengineering (3 credits) (3,0)

BIOE 8140 - Medical Device Commercialization (3 credits) (3,0)

BIOE 8600 - Biomedical Engineering Device Design Innovation (3 credits) (3,0)

BIOE 8610 - Biomedical Engineering Product Translation (3 credits) (1,6)

### **Recommended Elective:**

BIOE 8900-Internship (1-6 credits)

*The additional 16 credits of graduate technical elective courses may be selected from the list of course offerings. Please contact the M.Eng. Degree Program Coordinator for assistance.*

## **Master of Science in Bioengineering**

The curriculum for the M.S. degree in bioengineering is designed around two basic options: a thesis option requiring formal research, and a non-thesis option that concentrates on course work but requires a report. The final defense for the non-thesis option will cover the student's entire course work reflecting this emphasis on courses. The report will usually take the form of an in-depth literature survey or a detailed analysis of a sub-topic within the field of bioengineering.

General requirements for both options are:

1. The student must spend at least one academic semester in residence.
2. The usual minimum time period necessary to complete all requirements is 18 months.
3. The student must successfully present and defend a thesis or report in an oral comprehensive examination, which will be open to the public.

Requirements specific to the thesis option are:

1. The student must successfully complete a minimum of 30 semester hours, which include six semester hours of research, which will provide the basis for a thesis.
2. The student must submit an approved thesis to the Graduate Dean at least one week before the end of the semester in which the degree is expected.

Requirements specific to the non-thesis option are:

1. The student must successfully complete a minimum of 33 semester hours which include six semester hours of non-thesis research, special topics, or internship at an approved external institution.
2. The student is required to prepare a report whose subject will be chosen by the advisor, in cooperation with the student. The report must be comparable in form and quality with technical review articles appearing in peer reviewed journals and with approval by the advisory committee.
3. The student is not required to submit the report to the Graduate School.

### List of Courses for MS Students

| Course #                |   | Course Title  | Notes   |
|-------------------------|---|---|---|
| <b>Required courses</b> | 1. CU: BIOE 6150 or BIOE 8160                         | Research Principles   | 1 credits<br><br>*Students with a BS degree in Bioengineering from Clemson may substitute this course with advisor consent. |
|                         | 1. MUSC: CGS 710                                      | Essential Scientific Practices I: Responsible Conduct of Research | 1 credit offered by MUSC, College of Graduate Studies:  |
|                         | 2. BIOE 8000  | Seminar in Bioengineering   | 1 credit per semester<br><br>*A maximum of 2 credits may be used in GS2   |
| <b>Core course I</b>    | 3. BIOE 8010  | Biomaterials  | 3 credits   |
| <b>Core course II</b>   | 4. Choose one from these three bioengineering courses | BIOE 8200, Structural Biomechanics                                | 3 credits   |
|                         |   | BIOE 8470, Transport Processes in Bioengineering                  | 4 credits   |
|                         |   | BIOE 8700, Bio-instrumentation                                    | 3 credits   |
| <b>Core course III</b>  | 5. BIOE 8460  | Biomedical Basis for Engineered Replacements                      | 3 credits   |

# **Degree Program for Doctor of Philosophy**

## **General Information**

Graduate work leading to the Doctor of Philosophy degree is intended to provide the student with knowledge of his or her field of specialization and a mastery of both associated fields and methods of research. The degree is not awarded solely on the basis of course work completed, residence, or other routine requirements. Important bases for granting this degree include a favorable evaluation of: grasp of the subject matter of a broad field of study, competence for planning and conducting original research, and the ability to communicate adequately and professionally in both the oral and written forms of the English language.

## **Entrance to Doctoral Studies**

The student who wishes to embark on a graduate program leading to the Doctor of Philosophy degree in bioengineering must provide evidence of potential for success in advanced graduate study. To this end, the student must pass the departmental doctoral program qualifying examination and their doctoral research proposal defense prior to officially being admitted into the doctoral program. An MS degree is not necessary to enroll in the doctoral program.

## **Specific Regulations**

Doctoral work, dealing with intensive study and research as it does, requires dedication and devotion to the subject of inquiry. The desired level of concentration and concern cannot be achieved where the student holds, throughout the period of his study, a full-time job not connected with his or her field of research. For this reason, to receive the Doctor of Philosophy degree, the student must complete a minimum of two semesters of academic work in the doctoral program on the Clemson University campus.

## **Qualifying Exam and Proposal Defense**

Please refer to Appendix for Rules and Regulations of the PhD Qualifier Exam.

The qualifier exam will be followed by the defense of the research proposal on the doctoral research topic to be conducted and administered by the research advising committee under the supervision of the major research advisor (see Appendix). On successfully passing the proposal defense, the student is formally admitted as a candidate for the Ph.D. degree. Satisfactory completion of the qualifier exam and proposal defense must occur no less than six months and no more than five years prior to the date of graduation. Other policies and procedures established by the Graduate School regarding the Qualifying Exam must be followed (please refer to the Graduate School webpage to access this information)

## PhD Curriculum

Total of 60 credit hours composed of the following:

- 10 core course credit hours
  - BioE 8160 (3)
  - BioE 8460 (3)
  - STAT 8010 (4)
- 6 credit hours of graduate BioE Seminar
  - BioE 8000 (1 per semester)
- 26 graduate elective credits (see list of track electives)
- 18 credit hours of doctoral research
  - BioE 9910

Consult with research advisor and PhD dissertation committee members regarding elective credits. Please refer to Appendix for Ph.D course requirements and tracks.

### PhD students with MS degrees

Same as above but students may transfer up to 24 graduate level course credit hours approved by the advising committee meeting track requirements. Transfer of credits will be approved based on demonstrated equivalent course content and bioengineering context, and satisfactory student performance in the transferred course (minimum of 'B' grade or higher required). All transfer courses must also be approved by Graduate School. Please refer to Graduate School policy on transfer credits in the Graduate School Handbook:

[http://www.clemson.edu/graduate/files/pdfs/GS\\_Policy\\_Handbook\\_May2015.pdf](http://www.clemson.edu/graduate/files/pdfs/GS_Policy_Handbook_May2015.pdf)

### Transfer of Undergraduate credits

Undergraduate coursework may not be transferred for graduate credit. However, completed undergraduate courses that serve to satisfy a deficiency, qualify as such only if the student had obtained a 'B' grade or higher in the course. A 'C' grade will be subject to review by the student's advisor in consultation with the faculty. A 'D' grade or lower will require the student to re-enroll for the course or in equivalent pre-requisites, which will not be considered towards minimal graduate credit requirements.

### Summer Enrollment

Students on graduate assistantship are required to enroll for 6 credit hours in the long summer session.

### Exceptions or Exclusions

Deviations from the study tracks above will be reviewed and acceptability decided upon on a case-by-case basis by the student's primary research advisor, the student's dissertation committee and the department chair.



# Financial Aid

## Assistantships

The basic form of financial aid for graduate students is the graduate assistantship. The customary appointment requires (nominally) 20 hours of work per week outside coursework including BIOE 8910 and BIOE 9910. To maintain a graduate assistantship in the Department of Bioengineering the student must be continuously enrolled full-time at Clemson during each term: nine (9) credit hours per semester and six (6) credit hours for each summer session.

## GTA and GLA

The Department of Bioengineering provides funding to select graduate students in the form of graduate teaching assistantship and graduate laboratory assistantship. Both graduate teaching assistants (GTAs) and graduate laboratory assistants (GLAs) serve each semester as a co-instructor, a teaching assistant, a laboratory assistant or a grader for bioengineering courses. GTA and GLA funding is only provided to students enrolled in the doctoral program. A letter of offer is sent to the student and signed by the chair of the department. The assistantship is renewed yearly based on performance in the classroom or laboratory as an instructor, a teaching assistant, a laboratory assistant or a grader, as well demonstrated satisfactory progress toward the degree (as documented in Form 2 and Form 3 of the BIOE Student Evaluation System), typically for a maximum of four years. Full time enrollment is required from these students. Supervision for these assignments is assumed by the instructor of record of a course, a lab manager, or faculty in charge of a departmental facility. An assignment may include routine laboratory maintenance and clean-up, in addition to other activities associated with the assigned laboratory/lab course, and not necessarily directly related to the student's own research.

In the event where a GTA or GLA changes degree from PhD to MS (thesis or non-thesis), the graduate assistantship provided by the department will be terminated at the end of the semester before the Change of Degree becomes in effect.

## GRA

Graduate research assistantships (GRAs) are typically offered by individual faculty members based on need and the availability of funds. All applicants to our doctoral program are considered for available assistantship support opportunities. Specific terms are included in individual offer letter. GRAs are renewed based of satisfactory progress toward the degree (as documented in Form 2 and Form 3 of the BIOE Student Evaluation System) and to the discretion of the principal investigator and availability of funds.

## Time Capture

The Patient Protection and Affordable Care Act (the ACA), effective March 2010, continues to be implemented in stages. Per guidance from the University's General Counsel, in order to fully comply with this federal law and to avoid costly penalties, Clemson has taken action regarding student paid work experience.

In an ongoing effort to ensure compliance with the Office of Human Resources policies and procedures for [graduate student workers](#) it is required that all graduate assistants enter time worked in the [time capture system](#). See Human Resources website for more details ([http://media.clemson.edu/humanres/aca/time\\_capture\\_instructions.pdf](http://media.clemson.edu/humanres/aca/time_capture_instructions.pdf)). Failure to comply will result in termination of assistantship.

### **Other Financial Assistance**

Certain University and industrial fellowships and government traineeships are occasionally available to graduate students. Grants-in-aid and student loans are also available on a limited basis. Specific problems involving financial aid should be discussed with you faculty advisor and the Department Chair who will then refer the problem to the appropriate University office.

### **Fringe Benefits and Medical Care**

Fringe benefits such as paid vacations, paid sick leave, health and life insurance programs, etc. are not provided as part of any financial aid. All full time students, however, must participate in the University health plan. The services available in this program are outlined in the Graduate School Web site (<http://www.grad.clemson.edu/HealthInsurance.php>). An optional health and accident insurance is also available for a single student and for a student and spouse.

# General Departmental Regulations

## Ordering of Equipment and Supplies, P-Card and Buyways

Tracking order forms are located on the departmental website. Fill the form out completely, including account number, justification and obtain faculty advisor's signature. NOTE: the "justification" needs to be a short explanation of why the material is being purchased. Blanket statements like "for general lab use" are not acceptable. Upon faculty approval, take the form (or email the form) to Jessica Lang ([jllang@clermson.edu](mailto:jllang@clermson.edu)) in 201 Rhodes. You must include account number to be charged. Your order must not exceed \$2,500 (including handling and shipping charges). After you have placed your order, give the order form with any receipts or confirmation number to Jessica Lang. She will need this to attach to the packing slip and invoice for processing payment. ALL purchases on the PCARD and Buyways MUST be approved by the advisor or Principal Investigator before processing. Any deviations from policies and inappropriate use of the PCARD will automatically result in loss of privileges.

Any purchase over \$2,500 requires a purchase order. See Michelle Kirby for instructions on how to order items over \$2,500.

See departmental website for forms.

## Office Supplies

The department **does not** provide office supplies for students or research teams. Students should check with their advisor if they need supplies.

## Work Orders

Order for work to the machine shop, the physical plant, etc. should be prepared with adequate written descriptions and standard engineering drawings. These should be submitted to the appropriate supervisor or your faculty advisor who will then see to it that the work order is executed. Forms are available online at <http://www.clemson.edu/ces/documents/MTSWorkrequest.pdf>.

## Building Access, Keys and Security

Graduate students will have access to the building after hours by scanning their Tiger ID card in the outside doors sensors. Each graduate student will also be provided with a key or keys for admittance to their office area and to their assigned work area. Please see Leigh Humphries in 301 Rhodes (656-1857) for building access, keys and security. Because of the growing security problem on campus, all laboratories and office areas should be locked at the end of the workday.

The campus police, extension 656-2222, should be immediately notified of any suspected breach of security, such as tampered locks, missing items, or the presence of strangers in the office or laboratory areas who cannot account for their presence. The faculty advisor or department head

should also be informed of such occurrences (even during off hours, if the situation seems to warrant it).

\*\*\* A fee of \$25 will be charged for each lost key to be replaced

## **Safety**

The conduct of research carries with it an inherent risk of injury and impairment to health. Carelessness can increase this risk to a certainty, while observance of standard safety procedures and precautions can reduce this risk to levels below that of most common occupations. Mandatory safety training is required for all students, staff and faculty in the Department of Bioengineering. Please see Chad McMahan if you have not participated in the departmental safety training or for any other safety concerns.

You are the person responsible for your own safety, as well as the safety of those working with you. Any breach of safety procedures, whether from laziness or inadvertence, will be treated most seriously and will be entered in your record for consideration whenever your overall progress is assessed. Serious lapses can be cause for dismissal.

In case of emergency with injury during research projects, while attending meetings, conferences, etc. outside the university setting are dealt with as follows: Catastrophic injury (life threatening): Call 911; and call COMPENDIUM at 877-709-2667. Non-catastrophic injury (requires medical treatment but not life threatening): Call COMPENDIUM at 877-709-2667. It is recommended that the supervisor or advisor of the employee be the one calling COMPENDIUM. COMPENDIUM MUST be called before going to a physician or emergency room.

The Medical Surveillance Program (MSP) is the component of Clemson University's "Occupational Health and Safety Program" that provides Occupational Health oversight for students and employees with exposure to animals, biological hazards, and certain chemical and physical hazards. The Occupational Health Nurse (OHN) coordinates with the Department of Environmental Health and Safety (EHS), the Animal Research Committee (ARC), the Institutional Biosafety Committee (IBC), animal facilities and other departments, and each enrollee to identify, assess, and manage potential health risks. The Department covers expenses for shots and other related safety issues. Please see Maria Torres or Chad McMahan for more information. Medical Surveillance enrollment can be done online at: <http://www.clemson.edu/caah/MSP/enrollment.htm>.

For more information regarding safety, please visit our website at: <http://www.clemson.edu/ces/bioe/safety.html>

## **Mail**

The University mail service is to be used only for University related business. Your personal mail should be sent to your home. This is especially true of second and third class mail, which overloads not only the mailroom, but also our facilities within the Department.

Student mailboxes, located outside of 105 Rhodes, should be checked at least daily to facilitate intra-departmental communications.

### **Email**

Students will need to check their University email account frequently for department correspondence. This will be the primary method of communication used by the University and the Department of Bioengineering. It will be your responsibility to keep up with the information sent to your Clemson email account. If you have a graduate assistantship, be aware that you will have two different accounts: student and employee.

### **Telephone**

The telephones must be restricted to departmental business. If a graduate student wishes to make a long distance call, he or she must get approval from his or her faculty advisor or from the Department Chair.

### **Desk Assignment**

If available and as a privilege, each student will be assigned a desk and storage area, near his or her working area. Each student is responsible for assuring cleanliness of their workspace as well as their surrounding environment. Lack of responsiveness will result in desk space access/use removal.

### **Traffic and Parking Regulations**

All students and staff are required to register their automobiles with Parking Services, at which time a parking permit/tag will be issued. Thereafter, the automobile may be parked in the appropriate parking areas. Details of the traffic and parking regulations are included in the parking services website: <http://www.clemson.edu/campus-life/campus-services/parking/index.html>

## Miscellaneous

### **Income Tax**

As a point of information, you should be aware that the State of South Carolina levies an income tax, as does the federal government. Therefore, as a general rule both state and federal income taxes will be withheld from your pay and you will have to file income tax returns with both the state and federal tax agencies.

### **Driver's License and Automobile Registration**

A full time student need not become a resident of South Carolina and, therefore, need not obtain either a South Carolina driver's license or South Carolina registration for his or her car. If a student does become a resident of South Carolina, however, he or she must register the car with the state motor vehicle agency within 30 days after taking up residence in the state and must obtain a South Carolina driver's license within 90 days. The nearest motor vehicle division office is in Seneca.

### **Graduate School Academic Regulations**

All bioengineering students must review all academic regulations established by the Graduate School. These can be found in the Graduate School Policy Handbook: [http://www.clemson.edu/graduate/files/pdfs/GS\\_Policy\\_Handbook\\_May2015.pdf](http://www.clemson.edu/graduate/files/pdfs/GS_Policy_Handbook_May2015.pdf). Students must be especially aware of policies regarding Academic Integrity.

### **Acknowledgement Form**

All new students in the Bioengineering Department must return the acknowledgement form (see appendix) to Maria Torres, Graduate Student Services Coordinator, within the first week of enrollment in the program. No paycheck will be issued until the receipt of acknowledgement is returned.

# APPENDIX



## BIOENGINEERING GRADUATE PROGRAM

PHD Degree – 60 credits (including 18 research credits (BIOE 9910))

### DEPARTMENTAL CORE

- STAT 8010 – Experimental Statistics (4 credits)
- BIOE 8000 - Seminar (6 credits)
- BIOE 8160 - Bioengineering Career Professional Development (3 credits)
- BIOE 8460 – Biomedical Basis for Engineered Replacements (3 credits)

### TRACKS – RESEARCH FOCUSED

| <b>BIOMATERIALS ENGINEERING</b>  | <b>REGENERATIVE MEDICINE</b>   | <b>BIOELECTRICAL ENGINEERING</b>  | <b>BIOMECHANICAL ENGINEERING</b>  |
|--|--|---|---|
| <p><b>TRACK CORE CLASSES:</b><br/>           BIOE 8010<br/>           BIOE 8020<br/>           BIOE 8200</p> <p><b>TRACK ELECTIVES:</b><br/>           BIOE 6120<br/>           BIOE 6230<br/>           BIOE 8030<br/>           BIOE 8070<br/>           BIOE 8240/8241<br/>           BIOE 8410<br/>           BIOE 8470<br/>           BIOE 8700/8701<br/>           BIOE 8750<br/>           BIOE 6820/6821<br/>           BIOE 8900<br/>           OTHERS APPROVED BY STUDENT’S ADVISING COMMITTEE</p> <p><b>Track Members:</b><br/>           Bob Latour (Track Chair)<br/>           Jeoung Soo Lee<br/>           Frank Alexis<br/>           Sarah Harcum<br/>           Ying Mei<br/>           Alexey Vertegel</p> | <p><b>TRACK CORE CLASSES:</b><br/>           BIOE 8010<br/>           BIOE 8020<br/>           BIOE 8490<br/>           BIOE 8730</p> <p><b>TRACK ELECTIVES:</b><br/>           BIOE 8470<br/>           BIOE 6400<br/>           BIOE 8410<br/>           BIOE 8240/8241<br/>           BIOE 8200<br/>           BIOE 6120<br/>           BIOE 6230<br/>           BIOE 8740<br/>           BIOE 8750<br/>           BIOE 6820<br/>           BIOE 8900<br/>           OTHERS APPROVED BY STUDENT’S ADVISING COMMITTEE</p> <p><b>Track Members:</b><br/>           Dan Simionescu (Track Chair)<br/>           Aggie Simionescu<br/>           Ann Foley<br/>           Jeremy Mercuri<br/>           Naren Vyavahare<br/>           Ken Webb</p> | <p><b>TRACK CORE CLASSES:</b><br/>           BIOE 6310/6311<br/>           BIOE 6350<br/>           BIOE 8700/8701<br/>           BIOE 6710</p> <p><b>TRACK ELECTIVES:</b><br/>           BIOE 6230<br/>           BIOE 8900<br/>           OTHERS APPROVED BY STUDENT’S ADVISING COMMITTEE</p> <p><b>Track Members:</b><br/>           Bruce Gao (Track Chair)<br/>           Guigen Zhang<br/>           David Kwartowitz<br/>           Delphine Dean<br/>           Tong Ye</p> | <p><b>TRACK CORE CLASSES:</b><br/>           BIOE 8010<br/>           BIOE 8200<br/>           BIOE 6350</p> <p><b>TRACK ELECTIVES:</b><br/>           BIOE 6120<br/>           BIOE 6230<br/>           BIOE 6820/BIOE 8490<br/>           BIOE 8700<br/>           BIOE 8900<br/>           OTHERS APPROVED BY STUDENT’S ADVISING COMMITTEE</p> <p><b>Track Members:</b><br/>           Jiro Nagatomi (Track co-Chair)<br/>           Martine LaBerge (Track co-Chair)<br/>           Hai Yao<br/>           Melinda Harman<br/>           John DesJardins<br/>           Will Richardson</p> |

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# Bioengineering PhD Qualifier Exam – Rules and Regulations

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## TRACK SELECTION – MORE THAN ONE TRACK CAN BE SELECTED (WITH HELP OF ADVISOR AND ADVISING COMMITTEE)

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- Biomaterials
- Bioinstrumentation
- Biomechanics
- Regenerative Medicine

## QUALIFIER EXAM DATE (QUALIFIER MUST BE TAKEN NO LATER THAN ONE YEAR AND HALF YEAR AFTER PHD PROGRAM ENROLLMENT)\*

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- Fall semester –second week after beginning of classes ( Friday 1:00-4:30PM)
- Spring semester – second week after beginning of classes ( Friday 1:00-4:30PM)

## QUALIFIER EXAM FORMAT AND GRADING

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- A PhD student is required to meet with his/her advising committee no more than six months after enrollment (at least 3 months before qualifier exam) to be informed on topics to cover, general and project-specific, for qualifier exam.
- Written exam consists of 7 questions: 5 questions (from a list of 8) from selected research track(s), and 2 questions (from a list of 3 developed by the advisor) related to the student's research project. Questions will evaluate the student's ability to think critically and apply knowledge gained from the core track courses.
- Exam is administered and graded by appropriate faculty members.
- Grades are returned to the advisor who communicate them to the student.
- Passing grade is 75% or higher; if lower, a list of deficiencies is forwarded to the student. Graded exam is not returned to the student. The student can be invited to an oral exam.

## ORAL EXAM (IF NEEDED)

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- The oral exam is administered by a committee made up of 3 or more members: student's advisor (or committee member appointed by advisor) and appropriate faculty members.
- Other Clemson faculty members could also be invited (ad hoc) to cover specific expertise in which deficiencies were found as needed (statistics, etc.)
- Exam is administered no later than one month after receiving the list of deficiencies.
- Examiners will use a rubric developed by the department for grading. Grading is pass, fail, or conditional pass with condition specified by the oral examination committee.



## Acknowledgement Form

My signature certified that I have received the **Graduate Student Handbook for the Department of Bioengineering** at Clemson University. The departmental handbook refers all graduate students to the Graduate School webpage for information regarding Graduate School Policies and Procedures and Academic Regulations:

[http://www.clemson.edu/graduate/files/pdfs/g\\_s\\_policy\\_handbook.pdf](http://www.clemson.edu/graduate/files/pdfs/g_s_policy_handbook.pdf)

I have read the information and understand its requirements.

*The electronic version of this handbook is available on our website:*

[http://www.clemson.edu/cecas/departments/bioe/documents/grad\\_student\\_handbook.pdf](http://www.clemson.edu/cecas/departments/bioe/documents/grad_student_handbook.pdf)

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_