
2011

Graduate Program Handbook

Department of Biomedical
Engineering | UVA

Table of Contents

1.	INTRODUCTION	3
1.1	<i>WELCOME TO THE DEPARTMENT OF BIOMEDICAL ENGINEERING (BME)</i>	3
1.2	<i>FROM THE GRADUATE PROGRAM COORDINATOR.....</i>	4
2.	STUDENT ACTIVITIES, FINANCIAL AID AND SUPPORT	5
2.1	<i>BMES STUDENT CHAPTER AT THE UNIVERSITY OF VIRGINIA.....</i>	5
2.2	<i>FINANCIAL SUPPORT AND DEAN'S FELLOWSHIPS</i>	5
2.3	<i>ROTATION PROGRAM AND FELLOWSHIPS.....</i>	6
2.4	<i>DEPARTMENT SEMINARS AND STUDENT RESEARCH SYMPOSIA</i>	6
2.5	<i>STUDENT TRAVEL</i>	7
2.6	<i>OFFICE SPACE ASSIGNMENT</i>	7
2.7	<i>USE OF COMPUTER EQUIPMENT, LIBRARY, AND EXTERNAL FACILITIES</i>	7
3.	EDUCATION PROGRAMS AND REQUIREMENTS	8
3.1	<i>PROGRAM ADMINISTRATION</i>	8
3.1.1	<i>GRADUATE RECRUITMENT AND ADMISSIONS COMMITTEE</i>	8
3.1.2	<i>GRADUATE PROGRAM COMMITTEE</i>	8
3.1.3	<i>UNDERGRADUATE PROGRAM COMMITTEE.....</i>	9
3.2	<i>MENTORING POLICY.....</i>	9
3.2.1	<i>FACULTY ADVISOR</i>	9
3.2.2	<i>DOCTORAL ADVISORY COMMITTEE</i>	9
3.2.3	<i>DEPARTMENT OMBUDSMEN</i>	9
3.3	<i>ENGLISH LANGUAGE PROFICIENCY</i>	9
3.4	<i>GENERAL ACADEMIC REGULATIONS</i>	9
3.4.1	<i>STUDENT STATUS AND RESIDENCY REQUIREMENTS.....</i>	9
3.4.2	<i>TIME LIMIT FOR DEGREES.....</i>	10
3.4.3	<i>TRANSFER OF CREDIT</i>	10
3.4.4	<i>GRADUATE COURSE DROP DEADLINE</i>	10
3.4.5	<i>INCOMPLETE GRADES AND REPEATED COURSES.....</i>	10
3.4.6	<i>OUTCOME ASSESSMENT.....</i>	10
3.5	<i>MS PROGRAM.....</i>	10
3.6	<i>ME PROGRAM.....</i>	11
3.7	<i>PHD PROGRAM</i>	12
3.7.1	<i>REQUIREMENTS FOR A PHD DEGREE</i>	13
3.7.2	<i>FORMATION OF DOCTORAL ADVISORY COMMITTEE.....</i>	13
3.7.3	<i>DOCTORAL DEGREE PLAN OF STUDY AND COURSE WORK.....</i>	13
3.7.4	<i>COMPREHENSIVE (QUALIFYING) EXAMINATION</i>	15
3.7.5	<i>DEFENSE OF DISSERTATION PROPOSAL.....</i>	16
3.7.6	<i>DISSERTATION DEFENSE</i>	17
3.7.7	<i>TEACHING EXPERIENCE</i>	17
3.8	<i>GRADUATE OFFICE THESIS/DISSERTATION CHECKLIST.....</i>	18
	APPENDIX I: LIST OF FORMS.....	20
	APPENDIX III: COMMITTEES AND DIRECTORS (2009-2010).....	28
	APPENDIX IV: STUDENT ORGANIZATION OFFICERS	29
	APPENDIX V: IMPORTANT AND USEFUL CONTACTS AND WEBSITES	30

1. INTRODUCTION

1.1 WELCOME TO THE DEPARTMENT OF BIOMEDICAL ENGINEERING (BME)

We welcome you to the Department of Biomedical Engineering. Our mission is to develop intellectual leaders in the field of biomedical engineering. We hope that this student handbook will help you accomplish this goal, and make your time here both stimulating and rewarding.

Our program has a long-standing commitment to teaching and research education. Faculty research focuses in cardiovascular bioengineering, biomedical & molecular imaging, cellular & molecular bioengineering, tissue engineering & biomaterials, musculoskeletal bioengineering and computational systems bioengineering. This diversity highlights the field of biomedical engineering as an exciting multidisciplinary engineering profession.

The BME Department leads several partnerships between the Schools of Engineering and Medicine and the College of Arts and Sciences. In particular, a number of faculty in the department collaborate closely with researchers in the Cardiovascular Research Center and the Departments of Radiology and Cardiology. In cooperation with the Materials Science and Engineering and the Electrical and Computer Engineering departments, we are also committed to making major advancements in nanotechnology and microsystems-based sensing and monitoring. The integration of a wide spectrum of engineering and medical research in the BME department provides the foundation for a leadership position in BME research and education at the University of Virginia and in the nation.

Graduate school is a place to explore the boundaries of the possible and develop your scholarship potential to the highest level. This is the time to develop your independent thinking, seize the opportunity to interact with a wide range of talented student and faculty colleagues, enjoy the riches of the university environment, and be creative in everything you do. We welcome you as a partner in learning and as a colleague in BME.

Frederick Epstein, Ph.D.
Professor and Chair
Department of Biomedical Engineering

Jeffrey Holmes, M.D., Ph.D.
Associate Professor and Graduate Program Director
Department of Biomedical Engineering

1.2 FROM THE GRADUATE PROGRAM COORDINATOR

This handbook has been prepared to assist you both to make the transition into our graduate program and to serve as a resource for you during your pursuit of a graduate degree. Although you will have a faculty advisor who will help you with various aspects of your graduate program, it is your responsibility to make sure that you meet the requirements for completing the degree program. Therefore, please read this handbook carefully and keep it handy for future reference.

In addition to the handbook, there are a number of “people behind the scenes” who help the day-to-day work of the department to go forward smoothly, and who are also able to serve as resources for you.

Name	Role	Duties
Bob Anderson	Equipment Technician and Instrument Builder	laboratory instrument maker
Henry Pritchard	Information Technology	The department’s computer support technician
Kitter Bishop	Undergrad Program Coordinator and Executive Assistant to Chair	Responsible for the running of the undergraduate program, newsletter editor and assistant to the departmental chair
Chunxi “Tracy” Qi	Fiscal Assistant	Assists Viji and Joann with department fiscal work
Crystal Besecker	Graduate Program Coordinator/ BIMS Program Administrator	Responsible for the running of the BME graduate program and is available to help with any graduate program questions or concerns you may have, including financial aid, health insurance, and academic issues
Joann Jefferson	Fiscal Technician	assists Viji and coordinates department purchasing
Rich Haverstrom	HR Generalist	department HR person
Bobbe Nixon	Director of Internships and Corporate Outreach	based in Stacey Hall where she heads up the Student Team Corporate Design Project and the undergraduate summer internship program
Viji Srikanth	Grants Administrator	administers the department finances
Angel Thompson	Coulter Grant Assistant	assists the Coulter Project Director

We hope that you will find your time in the Department of Biomedical Engineering to be stimulating and rewarding!

2. STUDENT ACTIVITIES, FINANCIAL AID AND SUPPORT

2.1 BMES STUDENT CHAPTER AT THE UNIVERSITY OF VIRGINIA

The University of Virginia student chapter of the Biomedical Engineering Society (BMES) plays several roles within the department. Primarily, the chapter works to promote the exchange of ideas among students and faculty. We coordinate various educational, social, sporting, and service events throughout the year while reaching out to students who are interested in the application of science and engineering principles to medicine. Our chapter is comprised of undergraduate and graduate students within the BME department as well as students from other university departments who have an interest in BME. Our chapter has a strong record of service within the UVa and central Virginia communities and has been recognized by the National Biomedical Engineering Society several times.

Our BMES student chapter is dedicated to promoting the personal and professional development of its members and enhancing the community of scholarship within the department and the university. Our core values include fostering the development of our members via participation in BMES general body meetings and attendance at national conferences, departmental symposia, and university-wide colloquia; enhancing the sense of community within the department, university, and central Virginia community via community service events, orientation events for incoming students, jointly sponsored guest lectures with other student societies, and sponsoring student-student and student-faculty interactions both within and outside of the classroom environment; and increasing the chapter's visibility on the national scale via increased attendance and participation at national and international conferences, recruiting more guest speakers from national corporations, and enhancing communication with the BMES national chapter through the president and vice president of graduate and national affairs. We are dedicated to improving the understanding of the field of biomedical engineering, fulfilling the intellectual needs of our students, and assisting in their preparation for a career in biomedical engineering.

BMES focuses much of its energy on identifying and reconciling the needs of its students and the larger community.

The Biomedical Engineering Society is devoted to promoting the exchange of scientific ideas between undergraduate students, graduate students and faculty. Through research shadowing opportunities within our laboratories and those of our collaborators, as well as clinical shadowing opportunities being coordinated with the UVa School of Medicine, we provide students with a means of exploring their interests within this burgeoning field.

The society believes that social and service events foster a sense of community among the students and provides them a source of networking opportunities. We have numerous intramural sports teams during both semesters and routinely organize wine tasting tours, group dinners, and fundraising bar nights and happy hours where students and faculty can mingle in a more social setting. Our city-league softball teams have come away with two city championships (2006 co-rec, 2007 men's team) and one runner-up finish (2007 co-rec) in the past two years. Other events include tubing trips on the James River, ski trips to local resorts in the winter, and hikes on nearby trails along the Blue Ridge. We also help in organizing an annual holiday party in the winter in addition to the fall picnic noted earlier.

Our chapter holds approximately six meetings throughout the year that are open to undergraduate BME students, graduate BME students, and all other students interested in the field. In addition to brief announcements, each meeting also has a key focus, such as a grant writing workshop, an alumni panel, a graduate/medical school applications panel, and more. We invite you to browse through our website at <http://www.bme.virginia.edu/BMES/>. Our chapter has a strong record of excellent performance and has been recognized by the national BMES for several years. We hope to continue this tradition and hope that you will join us!

2.2 FINANCIAL SUPPORT AND DEAN'S FELLOWSHIPS

Graduate students in the Department of Biomedical Engineering are typically supported through a combination of Graduate Research Assistantships (GRAs), Graduate Teaching Assistantships (GTAs), appointments on training

grants, and Fellowships. Students on GTAs receive partial tuition and stipend support in return for their effort in assisting with education in specific courses at the University. Specific requirements and expectations will be defined by the instructor with whom the student is working.

Students on GRAs receive tuition and stipend support in return for their contribution to a specific research laboratory in the Department. Since these funds originate from individual faculty research grants, requirements and expectations are determined by the Principal Investigator, usually the student's research advisor. Students are expected to contribute at least 20 hours per week during the academic year and 40 hours per week in summer. Students should realize that research represents a major component of graduate education. Thus, a significant research effort will enhance a student's education and shorten the time required for degree completion. All doctoral students are required to participate as teaching assistants in BME courses as part of the degree program (see Section 4.7.7).

The 12-month stipend for GRAs and GTAs is \$26,500 for PhD students. Students receiving financial support are not generally allowed to work outside the University. There are periodic adjustments to the base stipend level to reflect cost-of-living-increases.

In order to be eligible for full financial support, students must register for 12 hours in each semester (6 research hours in the Summer). The hours may be any combination of course credits and research credits, or may be research only if all course requirements have been completed.

Students are encouraged to seek fellowship opportunities available to them from foundations, national societies, and the government, with the help of the faculty. All BME graduate students are members of the "BME Grad Awards" site on Collab which serves as a repository of information on graduate awards, fellowships, and scholarships.

2.3 ROTATION PROGRAM AND FELLOWSHIPS

Students supported by fellowships receive tuition and stipend as described under the conditions of the specific fellowship. In many situations, fellowships are meant to support a student's general education and do not entail specific time or task requirements. Departmental and training fellowships awarded to first-year students may require completion of a rotation program in the first semester of study. The rotation program is designed to broaden the perspective of students in biomedical engineering research and to help them to make an informed choice of laboratory for their thesis work. Students typically rotate in two laboratories identified during the interview and admissions process. It is expected that students will spend six weeks working in each lab during the Fall semester. Activities in the laboratory will consist of literature reading, participation in designated experiments, learning the specific aims and rationale of the faculty member's research, attending lab or journal club meetings, and presenting a summary of their experiences in each lab.

2.4 DEPARTMENT SEMINARS AND STUDENT RESEARCH SYMPOSIA

During the academic year, the BME Seminar Series is a weekly event that brings together faculty, students, and clinicians across disciplines from the University and Medical Center to learn about new research and technologies in the biomedical sciences and engineering. Research presentations are given by prominent speakers from within the university community and nationally recognized biomedical engineers, cell and molecular biologists and clinicians in academia and industry. There are special seminars presented throughout the year as well: a BMES student chapter sponsored speaker, BME Graduate Student Research Symposium, and the BME Distinguished Speaker Seminar Series. The Distinguished Speaker series is a great opportunity for all of us to hear from a prominent and internationally recognized leader in the field of biomedical science and engineering. These may include department chairs, national academy members, and industrial leaders in biotechnology.

All students and faculty are expected to attend each weekly Friday seminar. A "Meet the Speaker" session is open for all graduate students following the seminar presentation, and provides a unique opportunity for students to engage with seminar speakers in a more informal manner.

2.5 STUDENT TRAVEL

All students, particularly those in the PhD program, are encouraged to attend national, and where possible, international conferences with their laboratory group. Attendance at such meetings gives students opportunities to meet and interact with researchers with a broad range of interests. These experiences are instrumental in assisting students to develop, formulate, and modify their Master's and PhD projects and career plans. Also, excellent Career Fairs or networking opportunities exist at most major meetings.

Some student fellowships and traineeships have specific allotments for travel and other related purposes. Students working on research projects can sometimes arrange to have special expenses paid by a research grant. Consult your project director or faculty advisor.

In exceptional circumstances, students seeking travel and other funds for paper presentation who have exhausted other possibilities for funding their travel should submit a request accompanied by the research paper to the department Chair. Prior approval is required. Students should also be familiar with state regulations governing, for example, receipts to justify the expenditures, the use of state cars and the limits on lodging and meal costs. Students are responsible for making their own travel arrangements in compliance with University requirements regarding travel.

2.6 OFFICE SPACE ASSIGNMENT

Students may use desks in their advisor's laboratory or office space. Other spaces in the department are available upon request for student meetings or activities. The BME Department also has a small collection of books and journals in the Library (Rm. 2019). This is a reading/reference library and journals and books should not be removed from the room.

2.7 USE OF COMPUTER EQUIPMENT, LIBRARY, AND EXTERNAL FACILITIES

Students may generally use computer facilities and equipment with permission and after appropriate instruction. Courses and departmental projects have priority over all other users. PCs and laser printers in the computer room are connected to the local area network and are available for word processing and coursework. Research computer facilities such as those in the laboratories of individual faculty members can only be used with permission from the responsible laboratory director. Printers are to be used only for academic purposes.

With faculty supervision, use of facilities outside the Department should be arranged by the student and the concerned persons. Access to University computers can be obtained from the Office of Information Technology and Communication (ITC). The School of Medicine also provides computer-related service through the Office of ITC-Academic Computing Health Sciences (ITC-ACHS). The University and ITC give computer grants for specific research projects; these must be sponsored by a faculty member. Some professional societies, such as Sigma Xi, give small grants for student research.

3. EDUCATION PROGRAMS AND REQUIREMENTS

Biomedical Engineering represents an interface between engineering, medicine, and science. Consequently, it must draw on the full range of knowledge accumulated in the life sciences, medicine, the physical sciences and mathematics, and engineering. Technological development as well as the implementation of concepts, methods, and products in biomedical engineering requires competency in both the fields of engineering and medicine.

The M.S. and Ph.D. degrees form the core of the BME educational program. These degrees have the broad goal of educating students with the knowledge and skills needed to succeed in careers in research and development. Successful completion of these degrees will require that a student meet the following expectations, in addition to the formal degree requirements:

1. **Completion of original research.** Students will complete a research project under direction of their faculty advisor. The end goal of this work should be experimental or simulation results, methods, and analysis which are of a level of quality sufficient for presentation in a refereed publication. To achieve this end, the student's efforts will need to make a novel contribution to their respective fields. Students should always be aware that research is not a job performed for the benefit of his or her faculty advisor, but rather is an integral part of graduate education. As such, students must take initiative and responsibility for the success of their research.
2. **An ability to think critically.** Successful students will be able to evaluate the validity of new results and ideas. They will be able to make precise statements about limitations of experimental methods and identify the weaknesses of new and existing hypotheses. They will be able to identify the next step in their research and design experiments to test their hypotheses and/or designs.
3. **Critical knowledge of the core literature in their field.** Students should know the central literature in their field. They should be aware of the important implications and possible limitations of existing knowledge.
4. **Excellent oral and written presentation skills.** Success in both academics and industry requires clear communication of ideas to technical and lay audiences. Students should use graduate school as an opportunity to hone presentation skills.
5. **Completion of formal course requirements.** Course work provides students with basic knowledge and problem solving skills central to the field of Biomedical Engineering. In addition, advanced courses in the School of Engineering and Applied Science and in the School of Medicine offer knowledge and skills which can be applied to specialized areas of research.

3.1 PROGRAM ADMINISTRATION

Following is a list of committees designated to advise you on all aspects of BME graduate education. The committee members, your advisor, and the Department Chair are all available for consultation. A complete listing of committees and their members is included in **Appendix III**.

3.1.1 GRADUATE RECRUITMENT AND ADMISSIONS COMMITTEE

- a. Recruits students to apply and evaluates admission applications.
- b. Recommends new graduate students to the Chair for admission and financial support.

3.1.2 GRADUATE PROGRAM COMMITTEE

- a. Sets the ME, MS, and PhD requirements and approves programs of study.
- b. Formulates and assesses the course requirements for the degrees of ME, MS, and PhD.
- c. Advises students (along with their doctoral advisory committee) concerning the PhD program, including the announcement of the defense of the proposal and dissertation.

- d. Validates and approves results of all relevant examinations (comprehensive exams, dissertation proposals, master's thesis and dissertation defenses).
- e. Processes administrative forms such as **Doctoral Degree Plan of Study** and **Doctoral Advisory Committee**.

3.1.3 UNDERGRADUATE UROGRAM COMMITTEE

- a. Administers the BME Major.
- b. Administers the BME Minor Program.
- c. Administers the Undergraduate Engineering Science program for students who have chosen the Biomedical Engineering option.

3.2 MENTORING POLICY

3.2.1 FACULTY ADVISOR

Faculty advisors (usually the research project advisor) provide guidance to students on structuring their programs of study, career goals, identifying learning opportunities, and carrying out research of mutual interest. It is expected that advisors and students meet regularly to discuss progress.

3.2.2 DOCTORAL ADVISORY COMMITTEE

The purpose of this committee is to assist faculty advisors in advising their students. The committee should meet at least once a year with the student to gauge research and course work progress. BME faculty serving on this committee will be responsible for conveying the Departmental regulations to the student (and the advisor if he or she is not BME faculty).

3.2.3 DEPARTMENT OMBUDSMEN

Students are encouraged to express their comments and concerns regarding the graduate program in Biomedical Engineering. In order to insure that students have a point of contact for such concerns, the Graduate Program Committee chair and one additional faculty member (currently Dr. Michael Lawrence) will serve as Departmental ombudsmen. The ombudsmen should be considered by the students as individuals who are available for open discussion of concerns regarding their education. Any student can request a meeting with one of the ombudsmen at any time. These discussions will be strictly confidential.

3.3 ENGLISH LANGUAGE PROFICIENCY

All new graduate students whose first language is not English are tested for English proficiency near the beginning of their first semester at UVa. All non-native speakers of English take the Virginia English Language Proficiency Exam (VELP) and the SPEAK Test which are administered by the Center for American English Language and Culture (CAELC). Students must pass the SPEAK Test before commencing their BME Teaching Experience. If a pass grade is not achieved on the SPEAK Test, CAELC offers a program of courses of instruction in preparation for a repeat test at a later date. If a student takes the SPEAK Test in the Fall, portions of the VELP and the SPEAK Test are merged into a single composite exam.

3.4 GENERAL ACADEMIC REGULATIONS

3.4.1 STUDENT STATUS AND RESIDENCY REQUIREMENTS

Candidates for the Master of Science degree must complete at least one semester in residence as a full-time student at the University of Virginia. Candidates for the Doctor of Philosophy degree must complete at least three sessions (or the equivalent) of graduate study beyond the baccalaureate degree, or two sessions (or the equivalent) beyond the master's degree. At least one session beyond the master's degree must be in full

residence at the University of Virginia in Charlottesville. (A session is two semesters, not including the Summer semester.)

A student receiving financial support from the Biomedical Engineering Department, the School of Engineering and Applied Science, or the School of Medicine, must be registered full-time, defined as at least 12 credit hours of lecture/laboratory courses and/or research per semester during the academic year, and 6 credit hours of research only during the Summer. Students receiving financial support are not permitted to have other employment without prior approval of the Office of Assistant Dean for Graduate Programs.

3.4.2 TIME LIMIT FOR DEGREES

The time limit for completion of the MS is five years after admission. The time limit for the PhD is seven years after admission.

3.4.3 TRANSFER OF CREDIT

Master of Science candidates may transfer a maximum of 6 credits of approved graduate courses into the program. Master of Engineering candidates may transfer 12 hours of graduate credit. Doctor of Philosophy candidates' requests for transfer of courses from other schools of recognized standing must be submitted for approval *at the same time as* the program of study.

These graduate courses must have been completed at another school of recognized standing. They cannot have been used to satisfy requirements for another degree, and only courses with a grade of B or better may be transferred. All requests for the inclusion of transfer credit in the University of Virginia program of study are subject to the approval of the candidate's academic department and the Office of the Dean for Graduate Programs. Transfer credits should be submitted on the Request Approval of Transfer Credits form.

3.4.4 GRADUATE COURSE DROP DEADLINE

The last date for dropping a graduate course is nine weeks after the start of the semester. (After this date, a student may petition the Dean's office for a W or WP upon concurrence of his or her instructor and advisor.)

3.4.5 INCOMPLETE GRADES AND REPEATED COURSES

A 10-day period past the end of the semester (end of the examination period) is automatically allowed to remove an incomplete. Maximum extension to the end of the following semester (following Fall for a Spring class, and following Spring for a Fall class) may be granted by special request to the Dean's office. If a course is repeated, both grades are used in the GPA calculation.

3.4.6 OUTCOME ASSESSMENT

The School of Engineering and Applied Science has instituted an outcome assessment program. A set of student learning outcomes and associated assessment forms has been defined for each graduate program. The level of achievement of each outcome will be evaluated for every student as the student proceeds through the program. More information about outcome assessment (and the associated forms) can be found at the following links:

- <http://www.seas.virginia.edu/advising/degreqreq.php>
- <http://www.seas.virginia.edu/advising/gradprogassessment.php>
- <http://www.seas.virginia.edu/advising/allforms.php>

3.5 MS PROGRAM

The Master of Science degree requires a minimum of 24 credit hours of course work and satisfactory defense of a thesis, as outlined below. In addition to these academic requirements, certain administrative requirements must also be met.

MS Degree Academic Requirements:

1. A minimum of 24 hours of approved courses, including:
 - a. BME 6101, 6102, Physiology I and II.
 - b. BME 6310, 6311 Measurement Principles I and II .
 - c. 2 approved graduate engineering courses (5000-level or above) in one concentration.
 - d. At least one advanced course (7000 or above) in Biomedical Engineering.

The same course *cannot* be used to satisfy more than one of the above requirements. An average GPA of 3.0 is required for graduation.

2. Completion of at least 6 credit hours of Master's Thesis research (BME 8999).
3. Preparation of an MS thesis following SEAS guidelines.
4. Passage of an oral thesis examination given by the student's MS committee. This committee must consist of at least three faculty members including at least one primary BME faculty member and at least one member from outside the department. Adjunct faculty are acceptable outside members if they provide an objective and diverse viewpoint.

NOTES:

1. Students with equivalent prior course work may place out of some or all of the classes listed in Section 1 above by obtaining written permission from the course instructor and approval of the Graduate Program Committee. The "Permission to Opt-out of Department Core Course" form can be obtained from the Graduate Program Coordinator. Opt-out procedures typically include an oral or written examination in the course material.
2. A concentration (see 1.c.) must share common engineering concepts. It may cross departmental boundaries. A concentration must be approved by the Graduate Program Committee *before* courses are taken.
3. Research credit does not count towards the course work requirement listed in Section 1 above. Research credit is obtained by signing up for BME 8999.

MS Degree Administrative Requirements:

1. File a **Master's Degree Plan of Study** within one month of matriculation.
2. Present thesis research in the Annual Graduate Research Symposium.
3. Attend BME Seminars. Full attendance at the departmental seminar each week is required.

3.6 ME PROGRAM

The Master of Engineering degree has similar course requirements to those for the MS degree. Instead of a thesis, a supervised research project must be completed and described in a written report to be accepted by the advisor. A **Master's Degree Plan of Study** listing the entire course work should be submitted to the Dean's Office for approval. This should be done as soon as possible in the first few weeks of school but *no later than* the end of the first semester. Students are expected to complete all requirements by May of the second year.

ME Degree Academic Requirements:

1. A minimum of 30 hours of approved program of studies, including:
 - a. BME 6101, 6102, Physiology I and II.
 - b. BME 6310, 6311, Measurement Principles I and II .
 - c. One approved graduate engineering course (5000-level or above).

- d. At least one advanced course (7000 or above) in Biomedical Engineering.
- e. BME 8552 (ME Project; 3 credit hrs.).

The same course *cannot* be used to satisfy more than one of the above requirements. An average GPA of 3.0 is required for graduation.

2. Completion of an ME Project

- a. **Timing:** Student should register for the project (BME 8552) at an appropriate time. However, this is a graded course and (unlike thesis research BME 8995) tuition is charged for 3 hours of credit.
- b. **Approval:** The project proposal must be approved by the advisor. A one or two page proposal that the advisor finds acceptable is suggested to help the student focus on the intent and scope of the project. The project should require approximately two (2) months of full time effort.
- c. **Report:** A written report describing the project is required.

ME Degree Administrative Requirements:

- 1. File a **Master's Degree Plan of Study** within one month of matriculation.
- 2. Attend the BME seminars during residence. Full attendance at the departmental seminar each week is required.

NOTES:

- 1. The following **Outcome Assessment Forms** for the ME degree are required to be submitted to SEAS (Forms are available online at <http://www.seas.virginia.edu/advising/allforms.php>):
 - Engineering Design
 - Engineering Analysis
 - Technical Writing
 - Oral Communication
- 2. A detailed checklist titled **Reminder for Graduate Students - Master's Program** can also be found on page 24 of this document.
- 3. ME students who wish to enter the PhD program must complete a Request for Program Change form and submit it to the Graduate Admissions Committee for review during the regular admission process (by January 1 for entry the following Fall). An updated statement of purpose, letters of recommendation and transcripts must also be submitted.

3.7 PHD PROGRAM

Students intending to pursue a PhD in Biomedical Engineering are encouraged to apply to do so at the beginning of their studies at Virginia. *They may proceed directly to a PhD or earn a Master of Science or Master of Engineering degree along the way.* The necessary steps and requirements are described below.

Students who complete an ME, MS, or equivalent degree program in other institutions or have prior research experience in BME and related areas may request the approval of the Graduate Program Committee for admission to the PhD program. All students must pass the comprehensive exam.

Students who wish to bypass the Master's degree should apply directly to the PhD program in their initial application or complete a Request for Program Change form. This form must have the approval of the student's research advisor, the Graduate Program Committee, and the Department Chair. If the request to bypass the Master's degree is approved, the student should immediately form a Doctoral Advisory Committee and have a program of studies approved. The student must also schedule the Comprehensive Examination as well as the proposal and dissertation defenses as described in the **Reminder for Graduate Students - Doctoral Program**. **The Comprehensive Examination will usually be taken at the end of the second year of classes, subject to the recommendation of the student's Doctoral Advisory Committee** (see Section 4.7.4 for further details).

Students who wish to earn a Master's degree during their PhD studies follow much the same schedule. They should plan carefully to meet the Master's requirements and file both a Doctoral and a Master's program of study. Timely application for the Master's degree is essential. Such students should also complete a form, along with their advisor, signifying their commitment to continue on to the PhD degree. This form is available from the Graduate Program Coordinator.

Students who are not admitted initially to doctoral studies may apply near the end of their Master's work and upon recommendation of the Department and approval of the Dean be admitted to doctoral studies. The Comprehensive Examination will normally be taken on the same schedule, usually after the second year of classes (See Section 4.7.4 for further details).

3.7.1 REQUIREMENTS FOR A PHD DEGREE ARE AS FOLLOWS:

- a. Formation of Doctoral Advisory Committee
- b. Completion of Program of Studies/Course work
- c. Comprehensive (Qualifying) Examination
- d. Teaching Experience in BME courses
- e. Defense of Dissertation Proposal
- f. Dissertation Defense

A more detailed description of the requirements for the PhD program is given below.

3.7.2 FORMATION OF DOCTORAL ADVISORY COMMITTEE

Upon admission to the PhD program students should arrange for the appointment of a Doctoral Advisory Committee. The Doctoral Advisory Committee is a *resource* for you as you pursue graduate studies. It recommends, and gives initial approval to, a formal program of study, discusses research objectives and research plans with the student, and advises on the areas of study for the Comprehensive Examination. The Committee will meet with the student as needed to review progress and, if necessary, to revise the program of study. Students should consult with their Doctoral Advisory Committee *at least once a year* as their research progresses to ensure that their continuing research work is adequate as a doctoral dissertation. The Doctoral Advisory Committee *also* functions as the student's Examining Committee as he or she progresses through the PhD program.

The Doctoral Advisory Committee should consist of a *minimum* of five faculty members, including the student's faculty advisor; *at least two members* must be primary BME faculty, and one should be a minor representative from outside the BME department. The chairperson of the committee (who may **not** be the student's faculty advisor) **must** have a primary appointment in the BME department. (When the student's advisor is not on the BME faculty, the committee chairperson will function as a co-advisor and department representative.)

Students should consult with their advisors about the composition of their Doctoral Advisory Committees. The committee is officially formed by the completion of the **Appointment of Doctoral Advisory Committee form** which is reviewed and approved by the Graduate Program Director. Because the Doctoral Advisory Committee is a resource for you, it should be formed *as soon as possible*. For most students, this will be at the end of the **first semester of graduate study**. At the latest, the Doctoral Advisory Committee should be formed by the end of the **second semester of graduate study**. Students who have not formed a Doctoral Advisory Committee by the end of their fourth semester of study **will not** be permitted to take the comprehensive exam.

3.7.3 DOCTORAL DEGREE PLAN OF STUDY AND COURSE WORK

In deciding the doctoral course work and thus finalizing the PhD plan of study, students should seek assistance from their advisor and Doctoral Advisory Committee members and must obtain their approval. Because this is a **plan** of study, not a contract, students should make every effort to complete and submit it as soon as possible. This will allow the maximum flexibility for any necessary revisions to be made without delaying the student's progress to the PhD. The Plan of Study may be revised as necessary throughout the student's graduate study. Preparation of the **PhD Plan of Study** is an appropriate time to schedule the initial meeting with your Doctoral

Advisory Committee. Students, their advisors, and Doctoral Advisory Committee members are responsible to design a plan of study suitable for the individual and that meets the academic requirements of the BME PhD program. The plan of study may consist of more than the minimum required credits. **The form “BME Distribution Requirements” (see Appendix I for a sample) must be completed and submitted AT THE SAME TIME AS the plan of study form.**

The Plan of Study and “BME Distribution Requirements” should be submitted to the Graduate Program Coordinator *no later than the end of the first semester of doctoral study*. These forms may also be revised as necessary during the course of the PhD program, in consultation with the student’s Doctoral Advisory Committee. Students who have not submitted a Plan of Study and Distribution Requirements form by the end of their *fourth semester* of study (not later than May 1) will not be permitted to take the comprehensive (qualifying) exam. (See **Appendix II** for sample Programs of Study.)

PhD Degree Academic Requirements:

1. Twelve (12) courses of at least 3 graded credits each are needed past the bachelor’s degree (including any completed during a Master’s program).

Students who enter the program already holding a Master’s degree in an engineering discipline from a school other than the University of Virginia must take 12 credits of course work past the MS, in addition to the core BME courses (see number 2 below). These 12 credits must include at least 2 advanced BME courses.

2. A curriculum (or prior coursework) containing:
 - a. BME 6101, 6102, Physiology I and II.
 - b. BME 6310, 6311, Measurement Principles I and II .
 - c. 2 approved graduate engineering courses (5000-level or above) in one concentration.
 - d. At least 2 advanced (7000-level or above) BME courses.
3. Completion of coursework with a GPA of at least 3.0.
4. Passage of the Comprehensive (Qualifying) Examination (see Section 4.7.4 below).
5. Defense of Dissertation Proposal (see Section 4.7.5 below).
6. Completion of at least 24 credit hours of research.
7. Preparation of a PhD Dissertation following SEAS guidelines.
8. Passage of an oral final PhD examination (see Section 4.7.6 below).

Notes to PhD Degree Academic Requirements:

1. Students with equivalent prior course work may place out of some or all of the classes listed in Section 1 above by obtaining written permission from the course instructor and approval of the Graduate Program Committee. The “Permission to Opt Out of Department Core Course” form can be obtained from the Graduate Program Coordinator. Opt-out procedures typically include an oral or written examination in the course material.
2. A concentration (see 1.c.) must share common engineering concepts. It may cross departmental boundaries. A concentration must be approved by the Graduate Program Committee before courses are taken.
3. Research credit does not count towards requirement 1. Research credit is obtained by signing up for BME 999.

PhD Administrative Requirements:

1. Form Doctoral Advisory Committee and file out form *no later* than the end of the first semester of doctoral study.
2. File a **PhD Plan of Study** *no later* than the fourth semester of doctoral study (but preferably sooner).

3. Present dissertation research at the end of the third year of study and *again* in the Spring before expected graduation in the Annual Graduate Research Symposium.
4. Complete two semesters of BME Teaching Experience.
5. Attend all BME seminars.

Special Note for MSTP (MD/PhD) Students:

1. Med school physiology courses will be accepted in lieu of BME 6101 and BME 6102. These courses **DO NOT** have to be replaced with additional credits. MSTP students need to complete nine (9) courses of at least 3 graded credits each.
2. One semester of TA experience is required for MSTP students.

3.7.4 COMPREHENSIVE (QUALIFYING) EXAMINATION

The Comprehensive (or Qualifying) Examination is required by the School of Engineering and Applied Science and all doctoral engineering students must take the exam (see UVA Graduate Record for general guidelines). Students intending to take the Comprehensive (Qualifying) Examination must complete **PhD Plan of Study** and turn it in to the Graduate Program Coordinator for review by the Graduate Program Committee. This should be done *no later* than May 1 of the year that the student plans to take the comprehensive exam.

1. **Purpose:** To determine whether the student is able to comprehend and integrate a body of advanced knowledge, and is capable of original research. The student's ability to think, formulate, and present ideas is also evaluated.
2. **Timing:** All students should take the Comprehensive Examination immediately following the Spring semester of their second year. Earlier or delayed examination is subject to the approval of his or her Doctoral Advisory Committee. Passage is required to continue the PhD program, and students have two chances to pass the exam.
3. **Date of the Exam:** The Comprehensive Examination is normally given once a year. Exams are generally scheduled between the third week of May and the end of June. In March, a memo will be sent to qualified students and a sign up sheet will be posted in the BME Department. Students should obtain approval from their Doctoral Advisory Committee before signing up for the Comprehensive Exam. Students who have not previously met with their Doctoral Advisory Committees, **must** schedule an initial meeting no later than mid-way through the second year of graduate study. Failure to comply with this guideline may result in delay in the completion of your degree. The Comprehensive Examination is scheduled using the **Final Examination Committee** form.
4. **Format of the Comprehensive Examination:**
 - a. **Oral Examination:** The student will coordinate a date for this examination with the Graduate Program Coordinator, to occur between the third week of May and the end of June. The oral exam will be administered by the student's Doctoral Advisory Committee. At least four (4) members of the Doctoral Advisory Committee must be present for the Comprehensive Examination in accord with SEAS rules, including at least two (2) primary BME faculty members. The chairperson of the student's Doctoral Advisory Committee will coordinate the preparation of the oral questions, with input from the entire committee. The duration of the exam is three hours or less. The chairperson of the student's Doctoral Advisory Committee should submit a copy of the oral exam questions to the Graduate Program Coordinator for inclusion in the student's file seven (7) days prior to the scheduled date of the exam. The chair of the Doctoral Advisory Committee will deliver the exam questions to the student (by hard copy or by e-mail) seven (7) days prior to the scheduled exam date.

The oral examination will consist of a set of integrative questions (typically three) that have been prepared by the student's Doctoral Advisory Committee and provided to the student one week in advance of the oral examination. The questions will:

- assess the ability to integrate a body of advanced knowledge in biomedical engineering

- include experimental design and hypothesis testing
- have a design or a quantitative analysis component
- be based upon the individual's program of study, and include some aspects relevant to the anticipated thesis topic

The student may research the questions to develop his or her answers in the week prior to the oral examination. However, the student may not enlist the help of other individuals in preparing answers - to do so will be considered a violation of the honor code. The student will provide an oral answer to each of these questions and, at the discretion of the Doctoral Advisory Committee, further defend the answers.

In preparing materials to be presented for the oral exam, the traditional method has been to give oral answers, with some graphs, equations, etc. as needed on the board. You may **not** use PowerPoint slides or the overhead projector. You are expected to write on the board using handwritten notes, if necessary. The objective is to convey your approach and solution to the problems concisely and convincingly.

You may also give hand-outs to the members of your Doctoral Advisory Committee (which functions as your Examining Committee) at the start of the exam at the discretion of the Chair of the Doctoral Advisory Committee. You **may not** hand out extensive background literature, appendices of any type, or additional materials such as derivations, etc., if you do not plan to include them in your own oral answer.

If deemed necessary or appropriate by the Doctoral Advisory Committee, the student may then be questioned on any material germane to his or her plan of study. Successful completion of the oral examination is determined by the Doctoral Advisory Committee.

- b. **Passing:** Students must pass the oral examination.
- c. **Number of Chances:** The student will be allowed to take the Comprehensive Examination twice.

3.7.5 DEFENSE OF DISSERTATION PROPOSAL

1. **Purpose:** The student's Doctoral Advisory Committee will ascertain the quality of the student's research plan (including hypotheses to be tested, experimental design and methodology) and provide appropriate modifications to improve the proposed study.
2. **Timing:** The PhD candidate is expected to complete the defense of the dissertation proposal before his or her Doctoral Advisory Committee **no later than** 12 months after the Comprehensive Examination. Failure to complete and defend a dissertation proposal by the end of the third year of doctoral study may result in a delay in the completion of the program or even dismissal from the program. The dissertation proposal is submitted one week before the scheduled defense examination which consists of an oral presentation during which the student highlights the existing knowledge and the proposed new study. This will be followed by a question and answer period. The total duration of the dissertation proposal defense is typically two (2) hours, at the discretion of the Doctoral Advisory Committee. At least four (4) members of the Doctoral Advisory Committee must be present for the proposal defense in accord with SEAS guidelines, including two (2) primary BME faculty. The Dissertation Proposal Defense is scheduled using the **Final Examination Committee** form.
3. **Proposal Format:** The written proposal should follow the general form of an NIH grant application. Guidelines and suggestions for writing NIH applications can be obtained from the NIH website: <http://grants.nih.gov/grants/OER.htm> (a FAQs page is also available: <http://peacetech.com/phsforms/>). It is essential that you provide a clear picture of your research without exceeding the page limitations given below. Organize four sections of the research proposal to answer these questions: (a) What do you intend to do? (b) Why is the work important? (c) What has already been done? (d) How are you going to carry out the work? Following are more detailed instructions for implementing this format. Total number of pages **should not exceed 20, double-spaced**.

- a. **Specific Aims:** State concisely and realistically what the research described in this proposal is intended to accomplish and/or what hypothesis will be tested (no. of pages recommended is 1).
- b. **Significance:** Briefly sketch the background of the present proposal, critically evaluating existing knowledge and specifically identifying the gaps which the project is intended to fill. Most significant references should be cited, but the bibliography should not be exhaustive. State concisely the importance of the research described in this proposal by relating the specific aims to long term objectives (no. of pages recommended is 3).
- c. **Preliminary Studies:** Present clearly the studies you have performed which suggest the feasibility of your proposed research. Examine in detail the new information that can be generated from your study. Supplement with graphs, diagrams, and concise tables relevant to your research. Use this section to demonstrate your reasoning and experience to perform the project (no. of pages recommended is 7).
- d. **Experimental Design and Analysis:** Discuss in detail the experimental design/analysis and the procedures to be used to accomplish the specific aims of the project. Describe the protocols to be used and provide a tentative planned sequence for the investigation. Include the means by which the data will be analyzed and interpreted. Describe any new methodology and its advantage over existing methodologies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve your aims. Brevity, clarity, and completeness should be emphasized (no. of pages recommended is 9).
- e. **Time Table and References:** Should be concise but clear.

3.7.6 DISSERTATION DEFENSE

The doctoral dissertation should be typed according to the format of the School of Engineering and Applied Science (see Section 4.8 below).

1. **Purpose:** To demonstrate competence in the field of the dissertation research and the quality of the dissertation for publication in scientific journals.
2. **Timing:** At completion of writing an approved dissertation. The properly formatted draft with all the figures should be submitted to the Doctoral Advisory Committee at least two weeks before the examination. Using **Final Examination Committee** form, inform the Graduate Program Coordinator of the date selected for your defense and provide a short abstract of the work, so that an announcement of the defense may be sent out. Public announcement of the dissertation defense **must be made two weeks prior** to the scheduled examination date. Failure to do so will result in the rescheduling of the dissertation defense.
3. **Defense Committee Composition:** The Examining Committee for the dissertation defense **is** the student's Doctoral Advisory Committee. It must conform to the specifications indicated in section 4.7.2.
4. **Subject:** Defense of dissertation and questions about subject areas related to research field or arising from discussion of thesis work.
5. **Form:** The first part (40 minutes) is an oral presentation of the thesis which is open to the public. It is followed by a 1-2 hour oral defense before the Doctoral Advisory Committee and interested faculty.
6. **Failure:** Possibility for re-examination is determined by the Doctoral Advisory Committee.

NOTE: A detailed checklist for completion of the PhD program appears in the **Reminder for Graduate Students - Doctoral Program** which is available in the BME Office or on the School of Engineering and Applied Science website: www.cs.virginia.edu/graduate/gformspg.html.

3.7.7 TEACHING EXPERIENCE

All doctoral students must participate in two semesters of BME teaching assistantships in BME undergraduate or graduate courses as part of the requirement for the PhD degree, regardless of their source of funding for the stipend or fellowship. This experience is valuable in career development. The teaching experience will normally be performed in the second and third years of doctoral study.

3.8 GRADUATE OFFICE THESIS/DISSERTATION CHECKLIST

All Master's and Doctoral students preparing final thesis/dissertation copies for submission to SEAS and for binding must obtain **Instruction for Thesis Preparation** from the BME or SEAS Office. Please also refer to the following checklist. SEAS is preparing for Electronic Theses and Dissertations (ETD) in the near future. Once this program is live, students will submit their thesis or dissertation electronically into Libra and there will be no need for the student to seek a format check or Dean's signature from the SEAS graduate office.

GRADUATE OFFICE
THESIS/DISSERTATION CHECK LIST

Student Name _____
Last Name, First, MI
Date: _____

ARTS & SCIENCE, NURSING, EDUCATION
ENGINEERING, ARCHITECTURE,
DARDEN SCHOOL

<p>1. ORIGINAL & OR COPY (Copies can be made in any of the UVA Copy Centers (924-3785). Completed copies must be turned in <u>ONLY</u> at the Alderman Library Copy Center, 1ST Fl.</p> <p>A. Submittal Requirements for theses & dissertations</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 70%;"></td> <td style="text-align: right; width: 10%;">No. of Copies</td> <td style="width: 20%;"></td> </tr> <tr> <td>1. Arts & Science (Nursing)</td> <td style="text-align: right;">2</td> <td>(Nursing3)</td> </tr> <tr> <td>2. Education</td> <td style="text-align: right;">2</td> <td></td> </tr> <tr> <td>3. Darden School</td> <td style="text-align: right;">2</td> <td></td> </tr> <tr> <td>4. Engineering</td> <td style="text-align: right;">3</td> <td></td> </tr> <tr> <td>5. Architecture History</td> <td style="text-align: right;">3</td> <td></td> </tr> <tr> <td>6. Landscape Architecture</td> <td style="text-align: right;">2</td> <td></td> </tr> </table>		No. of Copies		1. Arts & Science (Nursing)	2	(Nursing3)	2. Education	2		3. Darden School	2		4. Engineering	3		5. Architecture History	3		6. Landscape Architecture	2		IF COMPLETE ✓
	No. of Copies																					
1. Arts & Science (Nursing)	2	(Nursing3)																				
2. Education	2																					
3. Darden School	2																					
4. Engineering	3																					
5. Architecture History	3																					
6. Landscape Architecture	2																					
<p>B. ORIGINAL and/or COPIES for school must all be single sided and printed/copied on acceptable perma-life watermarked paper. To ensure your copies/prints are on the correct paper please visit any of the UVA Copy Centers (Alderman, UVA Bookstore, Carruthers Hall Chemistry, Hospital) to have your thesis/dissertation printed or copied.</p>																						
<p>C. ORIGINAL and/or COPIES must be inserted in manila envelopes or small boxes and labeled (PLEASE PROVIDE ELECTRONICALLY PRINTED LABEL. SPCS is not responsible for errors due to misinterpretation of handwritten labels or typos on labels) with the following information</p> <p>Please include the following:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">NAME:</td> <td style="width: 50%;">JOHN SMITH</td> </tr> <tr> <td>SHORT TITLE (36 CHAR. INCL. SPACES)</td> <td>ENVIRONMENTAL EFFECTS OF OXYGEN</td> </tr> <tr> <td>DEGREE DATE</td> <td>MAY, 2008</td> </tr> <tr> <td>DEGREE & SCHOOL</td> <td>M.S., G.S.A.S.</td> </tr> </table>	NAME:	JOHN SMITH	SHORT TITLE (36 CHAR. INCL. SPACES)	ENVIRONMENTAL EFFECTS OF OXYGEN	DEGREE DATE	MAY, 2008	DEGREE & SCHOOL	M.S., G.S.A.S.														
NAME:	JOHN SMITH																					
SHORT TITLE (36 CHAR. INCL. SPACES)	ENVIRONMENTAL EFFECTS OF OXYGEN																					
DEGREE DATE	MAY, 2008																					
DEGREE & SCHOOL	M.S., G.S.A.S.																					
<p>D. DIGITAL FORMAT: Documents will only be accepted in PDF format (include all fonts, no compression or password protection). Please visit http://www.virginia.edu/uw/print/dissertation for complete details to ensure your files meet all guidelines. *Your "SIGNED" Title page/Signature page must be part of your final file.</p>																						
<p>2. APPROVAL</p> <p>A. Earned degree form for Arts & Science, Engineering & Education</p> <p>B. Copy of Signature sheet for Engineering, Architecture & Darden School</p>																						
<p>3. DISSERTATIONS</p> <p>A. Microfilm Agreement form:</p> <ol style="list-style-type: none"> 1. Microfilm agreement must be signed 2. An extra copy of the title page and short abstract (350 words or less) must accompany microfilm agreement form. 3. Copyright is optional, if desired, a copyright sheet must be included in each envelope with the following information: <table style="width: 100%; border: none; margin-left: 40px;"> <tr> <td style="width: 60%;">© Copyright by</td> <td style="width: 40%;">your name</td> </tr> <tr> <td></td> <td>All rights reserved</td> </tr> <tr> <td></td> <td>Date (Month & Year of graduation)</td> </tr> </table> <p style="text-align: center; margin-left: 40px;">must be copyright symbol, not @</p>	© Copyright by	your name		All rights reserved		Date (Month & Year of graduation)																
© Copyright by	your name																					
	All rights reserved																					
	Date (Month & Year of graduation)																					
<p>4. ABSTRACT</p> <p>Must be 350 words or less. A guide line for this is 1½ pages, double spaced with a 1" margin all around</p>																						
<p>5. MARGINS</p> <p>Left hand margin 1½", all other margins 1" including the page numbers for both thesis & dissertations.</p>																						
<p>6. PAGE NUMBERS</p> <p>All pages are to be numbered in upper right corner, close to the typed text. Please use correct pagination.</p>																						
<p>7. SUGGESTED PAGE ORDER</p> <p>A. Dissertation</p> <ol style="list-style-type: none"> 1. Title Page 2. Copyright page (if applicable) 3. Abstract 4. Signature page (if not on title page) 5. Dedication page (optional) 6. Body of text <p>B. Thesis</p> <ol style="list-style-type: none"> 1. Title Page 2. Abstract or introduction (if applicable) 3. Signature page (if not on title page) 																						

All the above requirements have been met and the manuscript is in proper order for submitting to Printing & Copying Services, 1st Fl. Alderman Library, for copying, binding and processing.

Approval Signature
(Graduate Office Representative)

Date

Revised 7/3/2003

APPENDIX I: LIST OF SCHOOL OF ENGINEERING AND APPLIED SCIENCE FORMS

If you want [Column A], then complete the forms in [Column B]

Ph.D.: Request appointment of your advisory committee. (replaces form G-103)	Doctoral Advisory Committee (may be re-submitted if changed)
Ph.D.: Submit a report of your PhD (qualifying, preliminary, comprehensive) examination (replaces form G107). You MUST also submit the program-specific qualifying exam assessment form (below)	PhD Examination Report and <u>Program Specific</u> Qualifying Exam Report
Ph.D.: Submit documentation of dissertation proposal, to be completed at the Proposal Examination. (replaces form G108) You MUST also submit the Engineering Dissertation Proposal Assessment form.	Dissertation Proposal and Engineering Dissertation Proposal Assessment
MS and Ph.D.: Request appointment of your final examination (defense) committee (replaces form G105)	Final Examination Committee
MS and Ph.D.: Submit a report of Final Examination, to be completed at exam (replaces forms G110 and G111). You MUST also submit a Thesis and Dissertation Assessment form and (Ph.D. only) a certificate of completion of the on-line Survey of Earned Doctorates	Report on Final Examination and Thesis and Dissertation Assessment Survey of Earned Doctorates
M.S. and Ph.D.: Obtain an official Approval Sheet and Signature page from your department, to be completed at the exam or after required corrections are complete.	SAMPLE Approval Sheet
MS/ME: Request approval of transfer credits/courses—will appear on U.Va. transcript (limit 6 in MS/12 in ME/ 15 in CGEP). (replaces form G112)	Request Approval of Transfer Credits
ALL Degrees.: Apply for graduate degree (submit by 10/1, 2/1 or 6/1) for graduation at semester's end. (replaces form G113)	Application for Graduate Degree
ALL Degrees: Request change of program/department or degree (replaces and supplements form G123)	Request Program Plan Change

Outcome Assessment Forms (also available on website)

- Engineering Analysis Assessment
- Engineering Design Assessment
- Engineering Dissertation Proposal Assessment
- Engineering Oral Communication Assessment
- Engineering Plan of Study Assessment
- Engineering Technical Writing Assessment
- Engineering Thesis & Dissertation Assessment

[Note: All forms may be picked up from the BME office OR downloaded from <<http://www.seas.virginia.edu/advising/allforms.php>>. All forms **MUST** be returned to the BME office.]

Name: _____ Advisor: _____ Date: _____

BME Distribution Requirements Form (PhD Students)
 (this form must be completed and returned *with* Doctoral Degree Plan of Study)

Plan of Study Rationale:

The core graduate curriculum is designed to provide a foundation in cell biology, organ physiology, and the measurement, quantitative analysis, and modeling of biologic systems. In addition to this foundation, most students will need additional depth in math, in at least one traditional engineering discipline, and in aspects of biology, physiology, pathology, and anatomy relevant to their research and career goals. Explain briefly how your plan of study addresses your research and/or career goals:

TABLE 1: PhD Students: Master’s Degree

Twelve courses of 3 graded credits or more past the bachelor’s degree or a minimum of 36 credit hours. Please PRINT legibly.

Distribution Requirement	Course(s) Fulfilling Requirement
a curriculum or prior coursework containing BME 6101, 6102 (Physiology I&II) BME 6310, 6311 (Measurement Principles I&II)	
2 advanced engineering courses in ONE area of concentration	
2 advanced BME courses (7000 or above)	

TABLE 2: PhD Students with M.S. or M.E. degree in Engineering

Core BME courses *plus* 12 credits of coursework past the Master’s degree (12-24 credits total). PRINT legibly.

Distribution Requirements	Course(s) Fulfilling Requirement
a curriculum or prior coursework containing BME 6101, 6102 (Physiology I&II) BME 6310, 6311 (Measurement Principles I&II)	
2 advanced BME courses (7000 or above)	

Name: _____ Advisor: _____ Date: _____

BME Distribution Requirements Form (MS/ME Students)
 (this form must be completed and returned *with* Master's Degree Plan of Study)

Please consult the BME Graduate Student Handbook section "MS Degree Academic Requirements" for more detail about course and degree requirements.

TABLE 1: M.S. Students. The Master of Science degree requires a **minimum of 24 credit hours** of course work and satisfactory defense of a thesis. Please PRINT legibly.

Distribution Requirement	Course(s) Fulfilling Requirement
a curriculum or prior coursework containing BME 6101, 6102 (Physiology I&II) BME 6310, 6311 (Measurement Principles I&II)	
2 advanced engineering courses in ONE area of concentration	
At least 1 advanced BME course (7000 or above)	



TABLE 2: M.E. Students. The Master of Engineering degree requires a **minimum of 30 credit hours** of course work. Consult the handbook "ME Program" section for more information.

Distribution Requirement	Course(s) Fulfilling Requirement
a curriculum or prior coursework containing BME 6101, 6102 (Physiology I&II) BME 6310, 6311 (Measurement Principles I&II)	
1 advanced engineering course AND BME 8552 (ME Project, 3 credit hours)	
At least 1 advanced BME course (7000 or above)	

University of Virginia
Department of Biomedical Engineering

Permission for Opting Out of Department Core Course

Student Name: _____ Advisor: _____ Date: _____

Program (circle one): ME MS PhD

Course Requested to Opt Out: _____

Reason (Please list relevant course(s) taken and grade(s) received. Attach syllabi OR describe course content.):

Approved by: _____ DATE: _____

Course Instructor
(Please PRINT name clearly AND sign)

Approved by: _____ DATE: _____

BME Graduate Program Committee Chair
(Please PRINT name clearly AND sign)

**OFFICE OF THE DEAN
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
UNIVERSITY OF VIRGINIA**

REMINDER FOR GRADUATE STUDENTS – MASTER’S PROGRAM

1. Request an advisor.

DUE – AS SOON AS POSSIBLE, BUT NO LATER THAN THE SECOND WEEK OF GRADUATE STUDY.

2. Meet with your advisor and prepare a **Plan of Study**. This plan must be approved by your advisor and by the graduate program director. In addition you must also complete the **BME Distribution Requirements form**.

DUE – BY THE END OF THE FIRST SEMESTER OF GRADUATE STUDY.

3. Apply for your degree on the **Application for Graduate Degree form**. You must also complete the application for degree in the Student Information System (SIS). In the event of failure to qualify for the degree by the designated date, *reapplication* is necessary at the appropriate time before the new expected date of graduation.

To apply for your degree in SIS, you must log into your SIS Student Center, select “Apply for Graduation” from the “other academic” drop down box. Select the correct program and degree, verify that your name is correct and as you wish it to be printed on your diploma. If you wish to make changes, you may edit your diploma name. Click *Submit Application* to complete the process. For more instructions, see <http://www.sis.virginia.edu/CenterHelp/graduationreference/index.html>.

DUE – BY OCTOBER 1 FOR JANUARY GRADUATION, FEBRUARY 1 FOR MAY GRADUATION, AND JUNE 1 FOR AUGUST GRADUATION.

4. If you are in the Master of Science program, submit one copy of your thesis to the Office of the Dean (A115 Thornton Hall). This must be a typed copy (complete and correct except for minor typographical errors) ready for distribution to the examining committee. The copy will be checked for format and returned to the candidate. Instruction for format can be obtained from your departmental Graduate Program Coordinator. NOTE: SEAS will be transitioning to electronic thesis/dissertation submissions in the very near future, which will eliminate the requirement to submit a hard copy prior to your final defense.

DUE – BY DECEMBER 1 FOR JANUARY GRADUATION, BY MAY 1 FOR MAY GRADUATION, AND BY AUGUST 1 FOR AUGUST GRADUATION.

5. Take the final examination for your master’s degree according to the format specified. The oral part of this examination is public and announcement of it must be distributed one week in advance. Appointment of the examining committee will be made upon request by your department on the **Final Examination Committee Form** and approved by the Office of the Dean (A115 Thornton Hall)

6. Submit three (3) copies* of final revision of the thesis ON ACCEPTABLE PERMALIFE PAPER signed by the author and the examining committee members in manila envelopes with the necessary information (see thesis checklist) on the front, along with a Placement Form. Information regarding binding is available in the Office of the Dean (A115 Thornton Hall).

7. Submit the **Report on Final Examination Form**.

DUE – AT LEAST 4 DAYS BEFORE GRADUATION DATE

8. Submit binding receipt to the Office of the Dean (A115 Thornton Hall) after delivering copies of thesis to Printing Services, Alderman Library, and making payment for binding.

DUE – AT LEAST 2 DAYS BEFORE GRADUATION DATE

*This is the minimum number of copies required by the University and does *not* include a copy for either the thesis director or the student—each of whom will generally desire copies.

**OFFICE OF THE DEAN
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
UNIVERSITY OF VIRGINIA**

REMINDER FOR GRADUATE STUDENTS – DOCTORAL PROGRAM – FORM G121

1. Request your department chairperson to recommend the initial appointment of a doctoral advisory committee. This committee should consist of at least four professors, one of whom should represent your minor interests and be from outside your major department. This committee should be appointed on **Doctoral Advisory Committee Form** and submitted to the Office of the Dean (A115 Thornton Hall) for approval.

DUE – AS SOON AS POSSIBLE, BUT NO LATER THAN THE SECOND WEEK OF DOCTORAL STUDY.

2. Meet with your advisory committee to formalize your objectives, research plans and to prepare a Program of Study. Submit a **Program of Study** to the Office of the Dean (A115 Thornton Hall). This program must first be approved by your advisory committee and by the department or curriculum chairperson. Any changes in this program must be processed in the *same* fashion. Requests for approval of transfer credits for graduate courses taken elsewhere should be made using the **Request for Approval of Transfer Credits Form**. We must have a transcript and a letter certifying course(s) was not used for another degree from previous institution.

DUE – BY THE END OF THE FIRST SEMESTER OF DOCTORAL STUDY.

3. Request and take the Ph.D. comprehensive examinations. Pass the comprehensive examination subject matter in your chosen field of study. The Office of the Dean (A115 Thornton Hall) should be requested to approve the examining committee one week in advance using the **Final Examination Committee Form**. The **Report on Final Examination** should be filed in the Office of the Dean (A115 Thornton Hall) within one week after the conclusion of the examination.

DUE – APPROXIMATELY THE SAME TIME COURSE WORK IS COMPLETED.

4. Submit a dissertation outline to the Office of the Dean (A115 Thornton Hall). This outline must have been defended successfully in a public oral presentation announced at least one week in advance. The outline must be approved by the advisory committee and by the department faculty or its designated committee. Apply for admission to candidacy for the Ph.D. degree using the **Request for Program Plan Change**.

DUE – AT LEAST ONE SEMESTER BEFORE YOU EXPECT TO RECEIVE YOUR DEGREE.

5. Apply for your degree on the standard **Application for Graduate Degree Form**. You must also complete the application for degree in the Student Information System (SIS). In the event of failure to qualify for the degree by the designated date, *reapplication* is necessary at the appropriate time before the new expected date of graduation.

To apply for your degree in SIS, you must log into your SIS Student Center, select "Apply for Graduation" from the "other academic" drop down box. Select the correct program and degree, verify that your name is correct and as you wish it to be printed on your diploma. If you wish to make changes, you may edit your diploma name. Click *Submit Application* to complete the process. For more instructions, see <http://www.sis.virginia.edu/CenterHelp/graduationreference/index.html>.

DUE – BY OCTOBER 1 FOR JANUARY GRADUATION, FEBRUARY 1 FOR MAY GRADUATION, AND JUNE 1 FOR AUGUST GRADUATION.

6. Submit one copy of your dissertation to the Graduate Records Office, A115 Thornton Hall. This must be a typed copy (complete and correct except for minor typographical errors) ready for distribution to the examining committee. The copy will be checked for format and returned to the candidate. Instructions for form can be obtained from the Biomedical Engineering Graduate Program Coordinator's office. **Please note this process will soon be changing to electronic submissions via LIBRA.** A committee consisting of *at least five* faculty members including the advisory committee should be appointed upon your request by

your department on the **Final Examination Committee Form** and approved by the Office of the Dean (A115 Thornton Hall) to conduct the final oral examination.

DUE – BY DECEMBER 1 FOR JANUARY GRADUATION, APRIL 1 FOR MAY GRADUATION, AND AUGUST 1 FOR AUGUST GRADUATION.

7. Take the final oral examination and arrange for the submittal of the **Report on Final Examination**. This examination is public and announcement of it must be distributed one week in advance.

DUE – TIME TO BE ARRANGED AFTER TENTATIVE ACCEPTANCE OF THE DISSERTATION BUT NO LATER THAN DECEMBER 1 FOR JANUARY GRADUATION, APRIL 1 FOR MAY GRADUATION AND AUGUST 1 FOR AUGUST GRADUATION.

8. Submit 3 copies* of the final revision of the dissertation ON ACCEPTABLE PERMALIFE PAPER *signed by the author and the examining committee members* in manila envelopes with the necessary information (see dissertation checklist) on the front, along with a Placement Form, Microfilming Agreement, one extra copy of the Abstract and Title Page, and Survey of Earned Doctorates form. Information regarding binding is available in the Dean's Office (A115 Thornton Hall).

DUE – AT LEAST TEN (10) DAYS BEFORE GRADUATION DATE.

9. Submit binding receipt to Office of the Dean (A115 Thornton Hall), after delivering copies of dissertation to Printing Services, Alderman Library and making payment for binding.

DUE – AT LEAST TEN (10) DAYS BEFORE GRADUATION DATE.

*This is the minimum number of copies required by the University and does not include a copy for either the thesis director or the student, each of whom will generally desire copies.

APPENDIX III: COMMITTEES AND DIRECTORS

UNDERGRADUATE PROGRAM DIRECTOR

William Guilford, Associate Professor
Tel. 243-2740; Email whg2n@virginia.edu

GRADUATE PROGRAM DIRECTOR

Jeffrey W. Holmes, Associate Professor
Tel. 243-6321; Email holmes@virginia.edu

UNDERGRADUATE PROGRAM COMMITTEE

Chair: W. Guilford (whg2n@virginia.edu, 243-2740). Members: T. Allen, J.Saucerman, S. Peirce-Cottler, J. Holmes (member at large)

GRADUATE PROGRAM COMMITTEE

Chair: J. Holmes (holmes@virginia.edu, 243-6321). Members: B.French, B.Helmke, C.Meyer, J.Hossack, J.Papin, J.Saucerman

GRADUATE RECRUITMENT AND ADMISSIONS COMMITTEE

Chair: S.Peirce-Cottler (holmes@virginia.edu, 243-6321). Members: B.Helmke, P. Kasson, K.Kelly, K.Janes, J. Hossack.

SEMINAR COMMITTEE

Chair: J. Papin (papin@virginia.edu, 924-8195). Members: B. Blackman, C. Meyer

APPENDIX IV: STUDENT ORGANIZATION OFFICERS

BMES STUDENT CHAPTER OFFICERS

Karin Holmberg, President of Graduate and National Affairs

Paul Jensen, Vice-President of Graduate and National Affairs

TBD, Secretary

TBD, Treasurer

Eric Greenwald, Social Activities Chair

Dr. Brian Helmke, Chapter Advisor

For questions regarding BMES, please contact Karin Holmberg at kjh8c@virginia.edu

GRADUATE BIOSCIENCES SOCIETY (GBS) OFFICERS

Erica Berzin, President

Amanda Gellest, Vice President

Caludia Han, Secretary

Brittany Johnson, Treasurer

Christy Nichols and Joseph Johnson, Publications Coordinator

Joe Tomlinson and Yiqi Huang, Social Coordinators

Tim Errington, GBS4 Coordinator

GRADUATE ENGINEERING STUDENT COUNCIL BOARD MEMBERS

Juan A. Lopez-Ruiz, President (ChE)

Sameer Bajikar, Vice President (BME)

Jennifer Prey, Secretary (Sys)

Lydia Abebe, Treasurer (Civil)

Saeid Dousti. IM Rep (MAE)

Jiyati Verma, Social Representative (EE)

Justin, Webmaster(EP)

Andrew King (MSE)

Krasimira Kapitanova (CS)

APPENDIX V: IMPORTANT AND USEFUL CONTACTS AND WEBSITES

General UVA information:

BME home page: <http://www.bme.virginia.edu>

BIMS home page: <http://www.bims.virginia.edu>

UVA Graduate Guide: <http://www.virginia.edu/graduateguide/>

UVA Health System home page: <http://www.med.virginia.edu/>

School of Engineering: <http://www.seas.virginia.edu/index.php>

School of Medicine: <http://www.healthsystem.virginia.edu/education-research/medschl.cfm>

UVA home page: <http://www.virginia.edu/>

Academic information:

Academic Calendar: <http://www.virginia.edu/registrar/calendar.html>

Course Offering Directory: <http://www.virginia.edu/registrar/> -- click on Course Offering Directory link

Registrar's Office: <http://www.virginia.edu/registrar/>

Summer Session Office: <http://www.virginia.edu/summer>

Library and computing facilities:

Charles L. Brown Science and Engineering Library: <http://www.lib.virginia.edu/brown>

Health Sciences Library: <http://www.healthsystem.virginia.edu/internet/library/>

ITC Web: <http://www.itc.virginia.edu>

OVID: <http://www.healthsystem.virginia.edu/internet/library/collections/databases/medlinehome.cfm>

Career planning:

Office of Career Planning and Placement: <http://www.career.virginia.edu/>

Office of Engineering Career Services: <http://www.seas.virginia.edu/careerdevelopment/>

Other useful information about the University:

Athletics: <http://virginiaspports.collegesports.com/>

Housing Division: <http://www.virginia.edu/housing/>

International Studies Office: <http://www.virginia.edu/iso/>

Intramural/Recreational Sports: <http://www.virginia.edu/ims/>

Parking and Transportation: <http://www.virginia.edu/parking/>

Student Health: <http://www.virginia.edu/studenthealth/>

UVA News: <http://www.virginia.edu/topnews/>

Scientific websites of interest:

Community of Science: <http://www.cos.com/>

NIH: <http://www.nih.gov/>

Information about Charlottesville:

Blue Ridge Apartment Council: <http://www.brac.com/>

Charlottesville links: <http://www.virginia.edu/exploring.html>

City of Charlottesville: <http://www.charlottesville.org>

University of Virginia Community Credit Union: <https://www.uvacreditunion.org/>

Charlottesville Area Association of Realtors: <http://www.caar.com>