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**DEPARTMENT OF BIOMEDICAL ENGINEERING
Graduate Handbook**

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Table of Contents

Colloquium..... 3

Advisor Selection (both MS and PhD programs) 3

Financial Support..... 3

Probation and Dismissal 4

Graduation 5

General Information 5

Identification Cards..... 5

University Closings..... 5

Keys 5

Mail..... 6

Outside Work 6

Parking..... 6

Security 6

Computers 6

Copy/Fax Machine 6

Grievances..... 6

Doctoral Degree Information..... 7

MASTER OF SCIENCE DEGREE POLICIES 10

Appendix A: Departmental Forms & GUIDELINES..... 14

ADVISOR SELECTION PROCESS..... 15

ADVISORY COMMITTEE SELECTION 16

MASTER PLAN OF STUDY..... 17

PROPOSAL MEETING..... 18

MASTER'S THESIS Advisor Approval For Committee Review 20

MASTER'S THESIS Defense scheduling 21

MASTER'S THESIS DEFENSE APPROVAL/DISAPPROVAL..... 24

Evaluation Rubric: M.S. Thesis Defense Examination 25

BME MS Procedures (to be Distributed to all Committee Members) 27

COLLEGE OF ENGINEERING PROPOSED THESIS AND DISSERTATION REQUIREMENTS 28

EVALUATION RUBRIC: PhD Dissertation and Examination..... 29

Graduate Student Check Out Sheet 30

RULES FOR COMPUTER USAGE..... 31

Appendix B: Interdisciplinary Doctoral Forms 32

Appendix C: Interdisciplinary Doctoral Procedures 33

Overview

In addition to undergraduate programs, the Department of Biomedical Engineering offers graduate programs leading to an MS (thesis) or PhD. The department has research specialties ranging from regenerative medicine to orthopedic biomechanics to optics to signal processing. The BME website offers information about specific research areas for the various full time and joint faculty in BME (bme.uakron.edu). To earn an MS degree, students must complete 33 credit hours of study, including 27 credit hours of course work and six credit hours of thesis work. PhD students must complete a minimum of 96 credit hours, including 48 hours of coursework beyond the undergraduate level. PhD students must pass a department qualifying examination, a candidacy examination, and present and successfully defend their dissertation. Research facilities are located in two campus buildings. The main departmental office, teaching facilities, and a few research laboratories are located in Auburn Science and Engineering Center West Tower. The remaining research facilities are located in Olson Research Center.

Graduate studies in BME are designed to be flexible enough to accommodate students with varied backgrounds and to promote an interest in theoretical and applied research while preparing the student for a career in industry, government or academia. Faculty members in the BME Department have strong research programs in a variety of areas and are active participants in the Institute for Biomedical Engineering Research.

Colloquium

The Department of Biomedical Engineering seminars are held throughout the semester. The seminars are presented by students, faculty, and other invited speakers. All full-time graduate students in the Department are expected to attend these seminars, and such attendance will be recorded. Full-time graduate students on graduate assistantships are **required** to take Biomedical Engineering Colloquium (4800:600) for one credit hour each semester on a credit/no credit basis. Repeated absence from the seminars will result in a grade of "no credit". Exemptions from this seminar requirement must be requested by the advisor and approved by the Department Head.

Advisor Selection (both MS and PhD programs)

Beginning the week before classes each semester, new graduate students who are not on research assistantships must talk to all faculty who are taking students regarding that faculty member's research, expectations, and opportunities (PhD, MS). Students will be asked to get a signature from each faculty member they meet with (see attached form). After meeting with faculty, each student should turn in the signature form with a ranking of the labs they would like to work in (they do not need to rank everyone they spoke with, only those they want to work in). The form can be turned in at any time, but must be in by the Friday of the 8th week of the semester, giving them 9 weeks to meet with faculty. The rankings will be collected and reviewed by the faculty members to best match student rankings and faculty needs.

Financial Support

Assistantships

To be considered for financial aid or assistantships, a student must first apply to the Graduate School and be admitted to the University and the BME Department as a graduate student. Applications for assistantships must be sent to the department to which students are seeking acceptance. Applications for a graduate assistantship should be submitted by February 1 for the Fall semester and September 1 for the Spring semester.

The BME Department offers departmental graduate assistantships (GAs) for a small number of

incoming graduate students, typically with Fall admission. These GAs have duties both as teaching assistants (TAs) and instructional assistants totaling 20 hr/wk. The GAs are expected to keep track of their time in these duties, and will be reviewed each semester to assure quality TAing and reliability. The stipend for BME (12 month) beginning in Fall 2017 is \$15,000 for MS students and \$23,000 for PhD students. Tuition scholarship for full time status is also included, but fees and insurance are not included.

Individual faculty may offer GAs with combined research and/or teaching duties totaling 20 hr/wk. These duties are set by the faculty member offering those assistantships, and can be withdrawn if adequate progress is not made toward research or teaching goals. The stipend is set by the faculty, but must be at least \$15,000 for MS students and \$23,000 for PhD students. Tuition scholarship may also be included, but fees and insurance are not included.

All students on GAs should use the following minimum credit guideline for credits to take each semester:

Fall/Spring: 9 credits each

Summer: 6 credits

It is important to note that if you withdraw from a course and/or go below 9 credits during the fall or spring or 6 credits in the summer, you will immediately lose your assistantship.

Fees and insurance are paid by the student.

For University information on GAs, please see the University graduate handbook online at: <http://www.uakron.edu/dotAsset/678001.pdf>.

Evidence of Financial Support

To cover full tuition and living expenses for 12 months (Fall, Spring, and Summer semesters; out of state tuition), students will need approximately \$25,400 (in 2013). International applicants should provide the Office of International programs with an original bank statement reflecting the appropriate amount stated herewith; copies of financial documentation will not be accepted. Applicants are encouraged to send the original financial documentation to the Office of International Programs at the same time the application for admission is sent to the Graduate School in order to prevent a delay in the issuance of the Certification of Eligibility. See <http://www.uakron.edu/oip/immigration/new-students/> for further information.

Probation and Dismissal

The Department of Biomedical Engineering requires that PhD students receive a grade of B or better in each core graduate course. As of Fall 2014, these courses are Fundamentals of Biomedical Engineering, Human Physiology, and Biometry. Students who do not receive a grade of B or better can retake courses once, but may have to pay tuition for any retake. Students in the PhD program who do not receive a grade of B or better may be moved to the MS program. The MS program requires an average of 3.0 in the three core courses.

Any student whose grade point average falls below 3.0 is considered to be on probation by the Graduate School. In computing the cumulative averages, "D" grades count as 0.0. The Dean of the Graduate Studies and Research, with the approval of the Department Head, may dismiss any student who accumulates six (6) hours of "C+" or below. The accumulation of four hours of "F" will result in mandatory dismissal. Students dismissed from the Graduate School for academic reasons may not be readmitted for one calendar year, and then only if evidence to support reasons for expected

improved performance is submitted and found acceptable.

Any student found to have used University facilities, Department of Biomedical Engineering facilities, or those of the associated medical institutions for illegal or unethical activities shall be subject to disciplinary action and possible dismissal under the due process procedures of the College of Engineering and the University.

Graduation

To be cleared for graduation, a candidate must have completed all course work, research and thesis/dissertation with a minimum overall grade point average of 3.0 for all graduate credits earned; filed appropriate forms at the Departmental level and an **Application for Graduation** with the graduation office according to the published schedules of those offices; paid all applicable fees; returned all University keys; and met any other department or university requirements.

These forms are **required** at the Departmental level and are typically filed near the time of graduation:

- *Graduate Student Check Out Sheet*
- *List of Presentations and Publications*
- *Evaluation Rubrics (appropriate for degree)*

In addition, the Department performs exit interviews with each graduate student. Please plan to return the interview forms and meet with the department chair or associate chair prior to leaving campus.

General Information

Identification Cards

Official University of Akron I.D. cards are issued to all students during registration. These should be carried at all times so as to allow for easy identification by security officers and other University personnel. In addition, these cards are required for access to several facilities. Students can also put money on their Zipcards to use on campus and at local restaurants. Lost cards must be immediately replaced to regain access.

University Closings

Students, faculty, and staff are not allowed on campus or in campus building when the University is officially closed. The University is closed: Labor Day, Thanksgiving, day after Thanksgiving, Christmas Day, New Year's Day, Memorial Day, MLK Jr. Day, and July 4th. The University may also close for weather emergencies or other days, particularly between Christmas and New Year's Day. If any student, faculty, or staff must come to campus, the University Police must be notified in advance (330-972-2911).

Keys

Students will obtain keys for the appropriate workspace(s) in Olson or ASEC. Students may also obtain keys to labs with the approval of the lab director. Key requests are made through the department administrator. Once the request has been processed, the student will receive notification that the key is ready and may pick it up from Locking Systems.

Cardswipe access began in 2012 for access to Olson and in 2013 to ASEC. Dr. Willits is the contact to gain access to Olson; individual lab access is controlled by the PIs. Charlotte LaBelle is the contact

to gain access in ASEC.

When the student leaves the department, all keys must be returned to Locking Systems. Failure to comply with this procedure will postpone the granting of degrees and/or final paychecks.

Mail

Student mailboxes are located in the Graduate Student room in Olson. Stamped, outgoing mail may be sent from the Department Office in ASEC. Mail is picked up and delivered daily.

Outside Work

Occasionally, a student holding a GA or other financial assistance from the Department of Biomedical Engineering may want to have additional part-time employment. When this is specifically precluded by the terms of their assistantship or other award, permission to hold outside employment must be obtained from their advisor or the Department Head, whoever is providing their funding. Such employment must not interfere with the fulfillment of any duties or responsibilities of the awarded financial assistance, nor should the ability of the student to make satisfactory academic progress be impaired. Additionally, outside work should not interfere with residency status.

Parking

All graduate students in the department may obtain a parking permit that allows parking in any University parking lot or parking deck area designated for student parking. The fee required for the parking permit will be paid by the Department for students holding tuition scholarships. Application forms are available online.

Security

Because the offices and laboratories in the Department are accessible to anyone gaining access to the building, security is a responsibility that must be shared by all members of the Department of Biomedical Engineering. Most important, all doors must be kept locked when a room is unoccupied. Strangers entering the department should be politely asked for whom they are looking and then escorted to the Departmental office for assistance.

Security officers do not know most occupants of research laboratories and, therefore, occasionally question someone having legitimate business there. Full cooperation is essential in these cases, and the officer should be politely given the information for which he or she asks.

Computers

Students using the computers located in the computer room in the Department of Biomedical Engineering are available via UAnet ID login. Use of these computers by students not enrolled for classes in the Department is strictly prohibited.

Copy/Fax Machine

Students are not charged for copies that are for their roles as a teaching assistant. Charges may apply for personal copies. Students may use the fax machine during **regular** business hours.

Grievances

Grievances are handled according to the Grievance Procedures for Graduate Studies, approved by the Graduate Council, January 31, 1980.

Doctoral Degree Information

Overview & Timeline

The Doctor of Philosophy in Engineering is an interdisciplinary doctoral program offered on a collegiate basis; however, when applying, a student must indicate BME as their primary discipline. The interdisciplinary program provides an engineering doctoral degree, which expands and enhances the student base, stabilizes the critical number of participating faculty, and expands the academic resources available for the doctoral program. A doctoral student must complete 96 credit hours of combined coursework and research credits as specified in their individualized Plan of Study. See Appendix B for the Interdisciplinary Doctoral Degree Forms and Appendix C for the Interdisciplinary Doctoral Degree Procedures.

The Ph.D. Program provides opportunities to conduct independent, contemporary and significant research in biomedical engineering. Students are expected to identify, formulate and analyze research questions using clinical, experimental, and/or theoretical investigation. The Program also develops students' interdisciplinary communication skills, thereby enhancing their ability to interact with other professionals.

Year 0

July: Graduate Course selection & registration
August (week before classes): BME Graduate Orientation

Year 1

August: Classes begin
August – October: Advisor selection
By May: Committee Selection
May: Qualifying Examination (\$500 addition to stipend if pass first time)
July: Finalize plans for coursework, research, and degree requirements

Year 2

By May: Complete Core and Elective Courses
Proposal Defense (~1 yr after qualifier; \$1000 addition to stipend when completed)

Year 3

Research
Committee meeting (Y3)

Year 4

Research
Committee meeting (Y4)

Year 5

Application for Graduation (Registrar sets dates for each semester)
2 weeks prior to defense: Public posting of defense date and abstract of dissertation
2 weeks prior to defense: Preliminary copies of dissertation to committee
Dissertation defense

PhD Qualifier

Student should take the qualifier in May of their entering academic year to be continued on a PhD level stipend. The purpose of the qualifier is to determine the student has sufficient BME undergraduate knowledge in the following core areas to qualify for doctoral studies:

Topics (Student completes 4 of 5 during the exam):

1. Materials Science
2. Fluid, Heat, & Mass Transfer
3. Mechanics
4. Circuits
5. Signals & Controls

Timing: 3rd Friday after classes end in the Spring semester

It is not anticipated or suggested that the content of an exam touch on all content of each topic. Rather, the qualifier is a means of determining the extent of a student's undergraduate knowledge and any technical weaknesses. If the student does not demonstrate sufficient knowledge in a topical area from the qualifier, the student may be allowed to retake the exam once.

Advisor Selection

Graduate students must select an advisor no later than the end of their first semester of full-time graduate study or before the completion of ten (10) graduate credit hours, whichever occurs first, to be eligible for assistantships. The advisor selection process is outlined above and the form is available in the Departmental Forms.

The graduate student may select his/her advisor from members of the full-time or affiliated faculty of the department. If an affiliated faculty member is selected as the advisor, a full-time faculty member of the Department of Biomedical Engineering must also be chosen to be the advisor pro forma.

Students must discuss their research interests with all faculty accepting graduate students before selecting an advisor. Time during the first few weeks of the semester should be spent shadowing or rotating in various laboratories. You should not only discuss potential research projects, but also inquire about funding for the project, fellowships, or travel.

The student must file "**ADVISOR SELECTION PROCESS**" (attached) with the department by end of the 8th week of the first semester of graduate study.

PhD Process

Upon arrival the student will meet with graduate committee chair (GCC) and attend any required orientations. The GCC will discuss course options and help develop an appropriate initial plan of study consisting of at most 18 credit hours. Before completion of the initial plan of study the student must identify an interdisciplinary field of study, a dissertation director and form an interdisciplinary doctoral curriculum (IDC) committee.

The chair of the Interdisciplinary Doctoral Committee (IDC) must be in the Department of Biomedical Engineering. Appointment of the IDC chair must be completed by the candidate by the second semester of study (Form: IDC-2). The IDC shall consist of at least five faculty members, of whom at least two members must be from the Biomedical Engineering Department and one from outside the College of Engineering. (Form: IDC-4)

The Plan of Study (IDC-5/6) is established by the IDC in accordance with the following guidelines:

- minimum of 96 total credit hours with a minimum of 48 credits of coursework
- at least 36 credits of the coursework must be at the 600-700 level approved by the IDC
- up to 6 credits could be substituted with 500 level coursework
- minimum of 24 credits within Biomedical Engineering (4800)

The intent of the coursework in the Plan of Study is to provide background necessary to conduct the dissertation research and prepare the student for a career in research. Coursework for other purposes may be included in the Plan of Study only if the IDC Committee deem appropriate. The Plan of Study must include a language requirement as specified by the Interdisciplinary Doctoral Procedures.

Upon completion of the Qualifying Examination, described above, Form IDC-1 must be completed and signed. The Qualifying Examinations is normally offered once a year. It must be taken no later than the end of the student's first year of study. At most one retake of the examination is allowed.

The purpose of the Candidacy Examination is to test the student's ability to conduct independent research. The student must pass the Candidacy Examination composed and administered by the IDC within one year after passing the Qualifying Examination, completing at least 90% of coursework. The student cannot enroll in doctoral dissertation credits before becoming a doctoral candidate upon passing the Candidacy Examination. Typically at the same time, the student must present an acceptable Proposal for Dissertation Research to the IDC. This should be done within one year after passing the Qualifying Examinations. The proposal shall be in written form and given to the IDC Committee at least 14 days prior to the scheduled date of the Dissertation Proposal oral presentation. Upon successful completion of these items, IDC Forms 8, 9, and 10 are to be submitted.

The dissertation must be a scientifically acceptable and comprehensive study whose format meets all accepted standards of the College of Engineering and the IDC. The dissertation defense must be publically announced 2 weeks prior to the date (Form: IDC-11) via email AND postings. Failure to comply with this date may result in delay of the defense. The written dissertation should be given to the IDC at least 14 days prior to the scheduled date of the oral defense. The doctoral candidate must successfully pass this oral defense allowing no "fail" vote from the members of the IDC (Form IDC-12).

Proposal for Dissertation Research Format

The proposal should be written early in the PhD process, as it helps direct the research of the candidate while informing the committee of the expected outcomes. Each proposal should be written within the confines of the format of a NIH R01 proposal. Specifically, these proposals should contain the following sections: Significance, Innovation, and Approach, and be no more than 12 pages (without references). The font size should be no smaller than Arial 11 pt and the margins set at 0.5". The content breakdown will vary depending upon the work.

CHECK-OUT

All students are expected to check-out from their laboratory and from the department. The thesis advisor should specify what is required, but typically includes all laboratory notebooks, data, data analysis, writing (in digital form), and a bound copy of the thesis. All students should consult with their thesis advisor in advance. Once the advisor signs the check out form (**GRADUATE STUDENT CHECK-OUT SHEET**), the form should be brought around for all departmental faculty to sign. The final departmental approval of degree conferral will not take place without the completed form. Exit interview forms are requested from every student to continuously improve the program.

MASTER OF SCIENCE DEGREE POLICIES

Overview & Timeline

The BME Department expects that most students will complete a thesis MS in 2 years. A total of 33 credits, with 6 credits of thesis and 27 credits of courses; your study plan is selected with your advisor. Colloquium is required for every semester of registration with an assistantship.

Year 0

July: Graduate Course selection & registration

August (week before classes): BME Graduate Orientation

Year 1

August: Classes begin

August – September: Advisor ranking

By May: Committee Selection

By August: Proposal Meeting

Year 2

4 weeks prior to defense: Thesis due to committee (after approval by thesis advisor)

2 weeks prior to defense: Public announcement of defense

Thesis Defense

2 weeks post defense: Submit changes to committee

I. SELECTION OF ADVISOR AND ADVISORY COMMITTEE

A. When to Select an Advisor and an Advisory Committee

Graduate students must select an advisor no later than the end of their first semester of full-time graduate study or before the completion of ten (10) graduate credit hours, whichever occurs first, to be eligible for assistantships. The advisor selection process is outlined above and the form is available in the Departmental Forms. The graduate advisory committee should be formed no later than the end of the student's second semester of full-time graduate study or after 16 graduate credit hours, which ever comes first.

B. Choosing your Advisor

The graduate student may select his/her advisor from members of the full-time or affiliated faculty of the department. If an affiliated faculty member is selected as the advisor, a full-time faculty member of the Department of Biomedical Engineering must also be chosen to be the advisor pro forma. Only those faculty holding Graduate Faculty Status I or II may be advisors for Master's students. Students needing assistance in the selection of an advisor should contact the Biomedical Engineering Graduate Committee.

Students must discuss their research interests with all faculty accepting graduate students before selecting an advisor. Time during the first few weeks of the semester should be spent shadowing or rotating in various laboratories. You should not only discuss potential research projects, but also inquire about funding for the project, fellowships, or travel.

C. Advisor Selection Form

The student must file "**ADVISOR SELECTION PROCESS**" (attached) with the department by end of the 8th week of the first semester of graduate study. The selection must be approved by the Biomedical Engineering Graduate Committee by the end of the student's first semester of full-time

study or the completion of ten graduate credits (as outlined in Part A).

D. Selection of the Advisory Committee

The advisory committee will be selected by the student in coordination with his/her advisor. The advisory committee shall consist of the student's advisor and at least two other faculty members, both holding Graduate Faculty Status I or II. At least one committee member must be a full-time faculty member of the Department of Biomedical Engineering. At least one additional member may be selected from the full-time, joint, or affiliated faculty of the Department of Biomedical Engineering. Additional members may be added to the committee, as deemed appropriate. The student shall give each committee member a list of the departmental requirements to inform the committee member of their time and effort commitments. The signatures of all Committee members must be recorded on the "**ADVISORY COMMITTEE**" form (attached). The final membership of the Advisory Committee must be approved by the Biomedical Engineering Graduate Committee at least two weeks prior to the student's proposal meeting.

E. Change of Advisor

Students may change their advisor during their course of study. Should a change of advisor be desired, the student should consult with the Head of the Department or the Biomedical Engineering Graduate Committee. A written request to make the change must be initiated by the student, signed by the student and the current advisor, and forwarded to the Biomedical Engineering Graduate Committee and Department Head for approval.

Should an advisor wish to terminate their advisory role with a student, the advisor should consult with the Department Head. The advisor should then make a written request, signed by the advisor and the student, and forwarded to the Biomedical Engineering Graduate Committee and the Department Head for approval.

Upon approval, the student is free to choose another advisor, and must do so by the end of the semester in which the change is initiated.

F. Change of Membership in the Advisory Committee

Membership in the advisory committee may be changed at any time, as long as the membership selection rules outlined in Part I-D (above) are followed. Members of the committee may resign by stating their wishes, in writing, to the advisor and the student. The advisor or the student may also request a change in the advisory committee and may do so by informing the departing member(s) and the Biomedical Engineering Graduate Committee, in writing. New or additional members may be appointed with approval of the Biomedical Engineering Graduate Committee, typically no later than two months prior to the student's defense.

II. MASTER PLAN OF STUDY

In consultation with the advisor and the advisory committee, each graduate student must develop a "**MASTER PLAN OF STUDY**" (attached). This form must be signed by the advisor (first), the advisory committee (second), and the Biomedical Engineering Graduate Committee (last) prior to the completion of 20 graduate credits. This form may be modified with the approval of the advisor and the Biomedical Engineering Graduate Committee. The master plan of study must conform with the Master of Science in Engineering curriculum requirements of the Department of Biomedical Engineering (Appendix A). Any courses which are officially waived or any exemptions from the curriculum requirements, must be acknowledged in writing by the student and signed by the course instructor or Department Head and forwarded to the Dean of the Graduate School.

III. DEGREE REQUIREMENTS

A. General Requirements

Students are advised to be familiar with the general and specific requirements for the completion of the Master's degree as contained in the Graduate School Bulletin and this document.

B. Proposal Meeting & Written Format

Each student is required to submit a thesis proposal to their advisory committee prior to the end of the first complete year of graduate study. The proposal shall consist of a written document, submitted to the committee 2 weeks prior to the proposal meeting, and an oral presentation at the proposal meeting. Each proposal should be written within the confines of the format of a NIH R01 proposal. Specifically, these proposals should contain the following sections: Significance, Innovation, and Approach, and be no more than 12 pages (without references). The font size should be no smaller than Arial 10pt and the margins set at 0.5". The content breakdown will vary depending upon the work. The completion of the proposal meeting will be acknowledged by the advisory committee on the **"PROPOSAL MEETING"** form (attached).

Students should bring the following forms to their proposal meeting:

EVALUATION RUBRIC: M.S. PROPOSAL

MASTER PLAN OF STUDY

PROPOSAL MEETING

BME MS PROCEDURES (TO BE DISTRIBUTED TO ALL COMMITTEE MEMBERS)

Additional committee meetings should be arranged at least once each semester following the proposal meeting to discuss the progress of the research and any additional concerns raised during the course of the research. A minimum of one committee meeting is required, subsequent to the proposal meeting and a minimum of two months prior to the thesis defense.

If a committee member should fail to attend the proposal meeting and/or the additional committee meetings without proper justification, the student and advisor shall decide whether to dismiss the committee member or not. Such a failure to attend the meetings shall be reported, in writing, by the advisor, to the Department Head. This memo shall also be copied and sent to the committee member's Department Head and Dean.

IV. THESIS

A. Style

Instructions for writing a master's thesis, prescribed by the Graduate School and the College of Engineering, are available online at <http://www.uakron.edu/dotAsset/678007.pdf>. Students should consult a style manual for appropriate style formats. Style manuals are available in the library and in the bookstore. All students should consult with their advisor and/or an outside editor (e.g., Writing Center, <http://www.uakron.edu/tutoring/bwc/index.dot>) for assistance prior to writing the final version of their thesis for grammar and spelling. Students whose dominant language is not English must also acknowledge the fact that additional time should be allowed for such assistance, and plan accordingly.

B. Timing

The thesis defense must be scheduled no less than six (6) months after the Proposal Meeting. Two weeks prior to the desired defense date, a final version of the thesis must be distributed to each Master's Thesis Committee member for review. The final version of the thesis must be signed and approved by the Thesis Advisor (using attached form) prior to distribution to the committee. Two weeks prior to the defense date, the student must post AND email the time and day of the defense within the Department and in other practical locations around the university. If any committee member requires that substantial corrections/modifications be made to the thesis, the Master's Thesis

Committee will discuss the required changes and agree on a course of action for the student to take, if possible, prior to a scheduled thesis defense.

C. Defense

The thesis defense will consist of an oral presentation of the thesis by the student (30 minutes in length), followed by a question and answer period. Both the presentation and the question period are open to the entire community. Following these sessions, the student and the Master's Thesis Committee shall meet in private to further discuss the thesis.

Students should bring the following forms to their defense:

LIST OF PRESENTATIONS AND PUBLICATIONS
MASTER'S THESIS DEFENSE APPROVAL/DISAPPROVAL
EVALUATION RUBRIC: MS THESIS DEFENSE
EVALUATION RUBRIC: MS THESIS
SIGNATURE PAGE OF THESIS

The student shall then leave the group and the advisory committee will discuss the changes to be made and the results of the thesis defense. The "**MASTER'S DEFENSE**" form (attached) will then be signed by all committee members, either as "Approval" or "Disapproval", stating that the Candidate has or has not fulfilled all of the Departmental requirements of a Master's Defense. A majority vote of the committee is required to approve the thesis. Should a committee member vote against approval of the Master's Defense, that person shall submit to the Department Head, in writing, their reasons for disapproval. It is the responsibility of the advisor to notify the student of the results of the defense within 24 hours and to communicate any required changes to the thesis. Changes to the thesis may be required prior to acceptance of the document. Acceptance of the thesis document is signified by a signature of the committee member on the thesis signature page.

After the thesis has been successfully defended, the student has two weeks to make all necessary changes to the text of the thesis and to provide any requesting committee member with a final copy of the thesis for review. Should the student not complete these changes, the faculty advisor, reader or Department Head may, at their discretion, require the student to re-define the thesis. The reader has a maximum of two weeks to identify any further corrections to be made to the thesis prior to final approval. The signature of the reader is then obtained on the signature page of the thesis. Once the reader's signature is obtained, the thesis then is passed on to the Department Head for review and approval. The thesis then proceeds to the Dean of the College of Engineering and then to the Dean of the Graduate School. See the University guidelines for the number of copies required for final submission to the Graduate School. During this review process, the student is advised to take a copy of the final form of the thesis to the Graduate School, where a proof reader will study the format of the document to check for adherence with the University's format guidelines. Thus, a minimum of 4 weeks are required prior to the deadlines provided by the Graduate School to process a thesis after committee approval.

V. CHECK-OUT & FINAL FORMS

All students are expected to check-out from their laboratory and from the department. The thesis advisor should specify what is required, but typically includes all laboratory notebooks, data, data analysis, writing (in digital form), and a bound copy of the thesis. All students should consult with their thesis advisor in advance. Once the advisor signs the check out form (**GRADUATE STUDENT CHECK OUT SHEET**), the form should be brought around for all departmental faculty to sign. A **LIST OF PRESENTATIONS AND PUBLICATIONS** form, signature page from thesis (signed), and thesis abstract must also be submitted to the department. The final departmental approval of degree conferral will not take place without the completed forms. Exit interview forms are requested from

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every student to continuously improve the program.

Appendix A: Departmental Forms & GUIDELINES

DEPARTMENT OF BIOMEDICAL ENGINEERING

ADVISOR SELECTION PROCESS

1) Meet with each faculty member who is accepting students (names below) by the Friday of the third week of the semester. At each meeting, obtain a signature from the faculty designating that you had a meeting. NOTE: Names will be updated each semester.

- i. Rouzbeh Amini _____
- ii. Brian Davis _____
- iii. Yang Liu _____
- iv. Marnie Saunders _____
- v. Hossein Tavana _____
- vi. Rebecca Willits _____
- vii. Yang Yun _____
- viii. Bing Yu _____
- ix. Christie Zhang _____
- x. other joint faculty _____

2) Turn in this form with a ranking of those advisors that you would like to work with by Friday, 5pm of the 8th week of the semester. You do not have to fill in every slot, nor do you need to list everyone you met with. Only those advisors that you would like to work with should be listed below.

- 1st. _____
- 2nd. _____
- 3rd. _____
- 4th. _____
- 5th. _____

3) Faculty will review the rankings with their own preferences. Students will be notified of the final selections by the end of the 15th week of the semester.

DEPARTMENT OF BIOMEDICAL ENGINEERING

ADVISORY COMMITTEE SELECTION

Student _____ **Signature** _____

* **Committee Member (Advisor):** _____

Department Full-Time Joint Adjunct Outside

Signature _____

* **Committee Member:** _____

Department Full-Time Joint Adjunct Outside

Signature _____

* **Committee Member:** _____

Department Full-Time Joint Adjunct Outside

Signature _____

* **Committee Member:** _____

Department Full-Time Joint Adjunct Outside

Signature _____

APPROVED (Associate Chair for Graduate Studies):

* Your signature verifies that you agree to serve on this student's committee and that you have read a copy of the **BMES MS Procedures**.

NOTE : When completed, give this form to the Department Secretary

DEPARTMENT OF BIOMEDICAL ENGINEERING

MASTER PLAN OF STUDY

Student _____ **Signature** _____

Advisor _____ **Signature** _____

Course	Cr.	Term Taken	Grade	Comments
BME Core (9 – 12 cr)				
4800:605 Fundamentals of BME				
4800:611 Biometry Physiology				
BME Electives (9 - 12 cr): must be BME (4800) Courses				
Approved Electives (6 cr): science, engineering, and mathematics				
Thesis (6 cr)				
4800 699 Thesis				
4800 699 Thesis				
4800 699 Thesis				

A total of 21 credits must be 4800 courses. A total of 24 credits must be engineering.

Approval Date _____

APPROVED (Associate Chair for Graduate Studies):

NOTE : When completed, give this form to the Department Secretary.

DEPARTMENT OF BIOMEDICAL ENGINEERING

PROPOSAL MEETING

Proposal Meeting Date: ____

Student ____

Signature _____

Thesis Advisor _____

Signature _____

Committee Member _____

Signature _____

Committee Member _____

Signature _____

Committee Member _____

Signature _____

Date planned for the next committee meeting: _____

Suggestions & Comments:

NOTE : When completed, give this form to the Department Secretary.

DEPARTMENT OF BIOMEDICAL ENGINEERING

EVALUATION RUBRIC: M.S. PROPOSAL

Candidate Name:

Date:

Degree/Program Code (program number): 480000MSE

Title of Thesis Proposal:

Evaluation	Does not meet Expectations (1)	Meets Expectations (2)	Exceeds Expectations (3)
Problem Definition: Has stated the research problem clearly, providing motivation for the work.			
Literature & Previous Work: Demonstrates sound knowledge of literature and previous work in the area			
Proposed Studies: Clearly describes the studies that are to be completed, including a timeline for completion, pertaining to problems at the interface of biology, medicine, and engineering.			
Quality of Written Proposal: Communicates the proposed studies clearly and professionally in the written proposal.			
Overall Assessment: The assessment of the overall performance of the candidate based on the evidence in the above items.			

Name of Examining Committee Member (print): _____

Signature of the Examining Committee Member: _____

Outcomes:

Learning outcomes for MS in Engineering, Biomedical Specialization:

1. A strong foundation of biomedical engineering knowledge that utilizes biological or physiological phenomena from a quantitative and systems perspective.
2. The ability to obtain and statistically analyze quantitative data pertaining to problems at the interface of biology, medicine, and engineering.
3. The ability to effectively communicate original scientific research in biomedical engineering.

DEPARTMENT OF BIOMEDICAL ENGINEERING

MASTER'S THESIS Advisor Approval For Committee Review

Proposed Thesis Defense Date: ____

Student Name: _____

Thesis Advisor Name: _____

APPROVAL

A signature below signifies that Thesis Advisor named above has reviewed the attached Master's Thesis and approves of its content and style and believes it to be in final form.

Thesis Advisor Signature _____ Date: ____

NOTE : When completed, attach this form to the thesis copies that are sent to the committee.

DEPARTMENT OF BIOMEDICAL ENGINEERING

MASTER'S THESIS Defense scheduling

This form must be turned into the Department Secretary at least 2 weeks prior to the defense date to allow for proper public advertisement. Attach to this form an advertisement that includes thesis title, student's name, advisor's name, date and place of defense, and the thesis abstract. If substantial changes to the thesis are required by any committee member, the defense date may need to be rescheduled.

MS Thesis Defense Date: _____

Signature indicates that the Committee Member has received the thesis in final form and the defense date above is agreed upon:

Thesis Advisor: _____ Signature: _____ Date: _____

Committee Member: _____ Signature: _____ Date: _____

Committee Member: _____ Signature: _____ Date: _____

Committee Member: _____ Signature: _____ Date: _____

NOTE : When completed, give this form to the Department Secretary.

DEPARTMENT OF BIOMEDICAL ENGINEERING

THESIS TITLE

Presented by: MS Candidate Name

In partial fulfillment of the requirements for M.S. in Engineering, Biomedical Concentration

Research Advisor: Research Advisor Name

Abstract:

Insert Abstract Here

DEPARTMENT OF BIOMEDICAL ENGINEERING

LIST OF PRESENTATIONS AND PUBLICATIONS

Candidate Name:

Date:

Degree/Program Code (program number): 480000MSE

Title of Thesis:

Conference Presentations: Please note the full reference followed by oral or poster presentation format. If none, put NA.

Journal Publications: Please note the full reference followed by ISI 5 yr Impact Factor. If none, put NA

Outcomes:

Learning outcomes for MS in Engineering, Biomedical Specialization:

1. A strong foundation of biomedical engineering knowledge that utilizes biological or physiological phenomena from a quantitative and systems perspective.
2. The ability to obtain and statistically analyze quantitative data pertaining to problems at the interface of biology, medicine, and engineering.
3. The ability to effectively communicate original scientific research in biomedical engineering.

DEPARTMENT OF BIOMEDICAL ENGINEERING

MASTER'S THESIS DEFENSE APPROVAL/DISAPPROVAL

Thesis Defense Date _____

Student _____

Advisor _____ Signature _____

APPROVAL

A signature below signifies that candidate named above has successfully passed their thesis defense. NOTE: Signature below does not signify approval of the thesis

Committee Member _____ Signature _____

Committee Member _____ Signature _____

Committee Member _____ Signature _____

Committee Member _____ Signature _____

DISAPPROVAL

A signature below signifies that candidate named above has not fulfilled all requirements of a Master's Defense. Should a committee member vote against approval of the Master's Defense or Thesis, that person shall submit to the Department Head, in writing, their reasons for disapproval.

Committee Member _____ Signature _____

Committee Member _____ Signature _____

Committee Member _____ Signature _____

Committee Member _____ Signature _____

NOTE : When completed, give this form to the Department Secretary.

DEPARTMENT OF BIOMEDICAL ENGINEERING

Evaluation Rubric: M.S. Thesis Defense Examination

Candidate Name:

Date:

Degree/Program Code (program number): 480000MSE

Title of Thesis:

Evaluation	Does not meet Expectations (1)	Meets Expectations (2)	Exceeds Expectations (3)
Problem Definition: Has stated the research problem clearly, providing motivation for the work.			
Literature & Previous Work: Demonstrates sound knowledge of literature and previous work in the area			
Results: Has applied research methods and tools to solve the problem. Has analyzed and interpreted results and data effectively.			
Quality of Written Thesis: Communicates research results clearly and professionally in the written thesis.			
Quality of Oral Defense: Communicates results clearly and professionally in the oral presentation and independently answers questions in the area of expertise.			
Overall Assessment: The assessment of the overall performance of the candidate based on the evidence in the above items.			

Name of Examining Committee Member (print): _____

Signature of the Examining Committee Member: _____

Outcomes:

Upon successful completion of a MS in Engineering (thesis), a student will be able to:

1. apply master’s level engineering concepts to research a new problem or answer a novel question by using engineering analysis, experimentation, and or computer simulations.
2. effectively communicate all aspects of their research project in both oral and in written form.

DEPARTMENT OF BIOMEDICAL ENGINEERING

EVALUATION RUBRIC: M.S. THESIS

Candidate Name:

Date:

Degree/Program Code (program number): 480000MSE

Title of Thesis:

Evaluation	Does not meet Expectations (1)	Meets Expectations (2)	Exceeds Expectations (3)
Problem Definition: Has stated the research problem clearly, providing motivation for the work.			
Literature & Previous Work: Demonstrates sound knowledge of literature and previous work in the area			
Results: Has obtained and statistically analyzed quantitative data pertaining to problems at the interface of biology, medicine, and engineering.			
Discussion: Has utilized the literature to put the results in the appropriate context.			
Quality of Written Thesis: Communicates research results clearly and professionally in the written thesis.			
Overall Assessment: The assessment of the overall performance of the candidate based on the evidence in the above items.			

Name of Examining Committee Member (print): _____

Signature of the Examining Committee Member: _____

Outcomes:

Learning outcomes for MS in Engineering, Biomedical Specialization:

1. A strong foundation of biomedical engineering knowledge that utilizes biological or physiological phenomena from a quantitative and systems perspective.
2. The ability to obtain and statistically analyze quantitative data pertaining to problems at the interface of biology, medicine, and engineering.
3. The ability to effectively communicate original scientific research in biomedical engineering.

DEPARTMENT OF BIOMEDICAL ENGINEERING

BME MS Procedures (to be Distributed to all Committee Members)

- * Committee Member signs form agreeing to serve on the student's Master's Thesis Committee
- * Committee Member agrees to a time and date for the Proposal Meeting and receives a copy of the Student's proposal 2 weeks prior to the scheduled date. Should the committee member miss the scheduled meeting without proper justification, the student and/or their advisor may choose to dismiss the person from the committee and the member's department head and dean will be notified of this absence.
- * A minimum of one additional committee meeting shall be scheduled prior to two months before the thesis defense.
- * Two weeks before the anticipated defense date, the Committee Member shall receive a copy of the Master's Thesis, in final form. The Thesis should contain the approval of the Thesis Advisor that the content is indeed in final form. The Committee Member has this time to read and comment on the thesis and to recommend changes to the content and style of the document. Should the Committee Member not return the thesis by the defense, the changes requested by that member shall not be mandatory. If the Committee Member feels that the thesis is not ready to be defended or that too many changes are required, that member may request a meeting of the committee to discuss such requirements.
- * At the time of distribution of the thesis in final form, which is approved by the Thesis Advisor, a time and date for the Master's Thesis Defense shall be agreed upon by all Committee Members.
- * After the completion of the defense, the Committee Member must sign the Master's Thesis Approval form under the heading of APPROVAL or DISAPPROVAL. Should the Committee Member sign under the disapproval heading, he/she must provide, in writing, their reasons for this decision.

COLLEGE OF ENGINEERING PROPOSED THESIS AND DISSERTATION REQUIREMENTS
JUNE 20,1989

To identify the attributes of the research done in the College of Engineering, the following information must be readily identifiable in all theses and dissertations submitted to the Dean for his signature.

ABSTRACT

- What was done ?
- Why was it done ?
- How was it done ?
- What was determined ?

INTRODUCTION

- Technological Significance
- Objectives - Preferably Itemized

CONCLUSIONS

- One conclusion for each objective
- Preferably Itemized

This information will be extracted and kept on file. If it is not readily identifiable, the thesis or dissertation will be returned for a re-write.

DEPARTMENT OF BIOMEDICAL ENGINEERING

EVALUATION RUBRIC: PhD Dissertation and Examination

Candidate Name:

Date:

Degree/Program Code (program number): 480000PHD

Dissertation Title:

Evaluation	Does not meet Expectations (1)	Meets Expectations (2)	Exceeds Expectations (3)
Problem Definition: Research problem stated clearly, provides motivation for work*			
Literature and Previous Work: Is aware of and makes use of relevant literature and previous work to frame the problem and identify uniqueness of the research problem*			
Impact of Proposed Research: Demonstrates the potential value of solution to the research problem in advancing knowledge within the area of study*			
Solution Approach: Applies appropriate state-of-the-field research methods/tools to solve the defined problem. Applies relevant criteria to validate the research methodology.			
Results: Results are correctly analyzed and valid conclusions drawn.			
Quality of Written Communication: Communicates research proposal and results clearly and effectively in the written dissertation			
Quality of Oral Communication: Orally communicates complex methods and results clearly and effectively. Able to answer questions in area of expertise and field.			
Critical Thinking: Demonstrates capability for independent research in area of study, significant expertise in the area and ability to make original contributions in field.			
Publications: Journal publications have or are anticipated from this research.			
Overall Assessment			

*May be evaluated in proposal as well as dissertation and defense.

Name of Committee Member (Print): _____

Name of Committee Member (Signature): _____

Ph.D. Outcomes: Upon successful completion of the doctoral program in engineering, a student will be able to:

- 1) Demonstrate advanced proficiency in the chosen engineering discipline.
- 2) Independently formulate, implement and develop an engineering research project
- 3) Apply technical expertise and critical thinking to yield original research results
- 4) Effectively communicate complex technical ideas in both written and oral form
- 5) Disseminate research results that meet the standards for scholarship in the discipline

**DEPARTMENT OF BIOMEDICAL ENGINEERING
THE UNIVERSITY OF AKRON**

Graduate Student Check Out Sheet

Instructions: Obtain signatures of all persons listed below before requesting the Department Head's signature on your Thesis or before leaving the Department.

Student's Name:
Thesis Advisor: _____

Department of Biomedical Engineering Faculty

The student listed above has returned all borrowed books, materials, and has fulfilled any other obligations. NOTE: The thesis advisor should sign first designating that the student has appropriately checked-out of their laboratory.

Dr. Amini _____	Dr. Liu _____
Dr. Tavana _____	Dr. Willits _____
Dr. Saunders _____	Dr. Yun _____
Dr. Keszenheimer _____	Dr. Zhang _____
Dr. Davis _____	Dr. Noble _____

Science and Technology Library:

All books have been returned to the library and has paid all fines (attach receipt).

Physical Plant:

All keys that were issued to him/her have been returned (attach receipt for return).

Department of Biomedical Engineering Secretary:

All copying and fax charges have been submitted and a forwarding address.

Secretary

Chair of the Department of Biomedical Engineering:

The student has, if applicable, vacated his/her desk, has terminated student employment jobs, has resigned his/her assistantship, and has completed any other known obligations to the department.

Chair BME

(Final Signature)

RULES FOR COMPUTER USAGE

Department of Biomedical Engineering
Computer Classroom

The computers in the classroom have been purchased by the Department of Biomedical Engineering to be used by faculty, staff and students of the department. **Use by any other persons is not authorized.**

- **NO food or drink is allowed in the computer room.** If you want to eat or drink, do it outside the room.
- Turn the machines OFF when you are finished using them. Use main power switch under the table.
- **Do NOT put illegal copies of software on these machines.** To do so is illegal, immoral and expensive if you get caught.
- Do not load programs which you get from "friends" or over bulletin boards on these machines. This is the usual route for "virus" infestations.
- Do not attempt to "boot" from a disk. This is how viruses get onto the machines.
- Do not put paper on the floor. This causes dirt from the floor to get into the printer mechanisms. Clean up your paper mess when you are finished. This includes the Laser Printer in the rear of the room.
- Do not remove the printer cover. Paper can be removed simply by lifting the cover. If you must remove the cover, put it back.
- Keep personal files and programs on your own disk. Do not put your personal files on the hard drive. **These drives will be wiped clean frequently with no warning.**
- Do not modify programs, files or configurations that are on the hard disk.
- Do not unplug equipment or change cable connections at the rear of the computers.

I have read and understand that my privileged use of these computers depends upon adherence to the above regulations. I understand that failure to follow these rules will result in cancellation of these privileges.

Signature:

Date:

Appendix B: Interdisciplinary Doctoral Forms

Up to date forms should be downloaded from the College website.

Appendix C: Interdisciplinary Doctoral Procedures

Up to date prodedures should be downloaded from the College website.