Department of Biomedical Engineering

The Department of Biomedical Engineering offers the Master of Science degree in Biomedical Engineering and the Doctor of Philosophy degree in Biomedical Engineering.

- M.S. in Biomedical Engineering (p. 1)
- Ph.D. in Biomedical Engineering (p. 3)

Master of Science Degree in Biomedical Engineering

A Master of Science (M.S.) degree in Biomedical Engineering (BME) at The University of Texas at San Antonio (UTSA) is offered through a joint graduate program with The University of Texas Health Science Center at San Antonio (UTHSCSA). A matrix of academic tracks is offered based on segments of biomedical engineering and/or areas of clinical emphasis. Specifically, the program has emphases in the following areas: biomaterials, biomechanics, and bioimaging. The biological areas covered are orthopedics/dental tissues, cardiovascular systems, and neural systems. The M.S. degree in Biomedical Engineering (Thesis Option or Nonthesis Option) will be awarded to candidates who have displayed an in-depth understanding of the concepts that are necessary for critically judging the scientific literature, for formulating novel hypotheses, designing experimental protocols to test the hypotheses, interpreting their results and demonstrating their ability to make an original contribution to knowledge in the biomedical field.

The regulations for this degree comply with the general University regulations (refer to Chapter 2, General Academic Regulations, and Chapter 4, Master’s Degree Regulations).

Admission Requirements

Students who hold an undergraduate degree may apply to the program. The minimum requirements for admission to the Master of Science degree in Biomedical Engineering program are described below. Note that admission is competitive and satisfying these requirements does not guarantee admission.

- Applicants must have a grade point average of 3.0 or better in the last 60 semester credit hours of coursework with a major in a recognized science or engineering discipline. All students should have had sufficient background in engineering, chemistry, biology, and physics prior to being admitted to the program. It is expected that these students will have B.S. degrees with an emphasis in either engineering, physical science, or biological science disciplines.
- All students are required to have completed at least one year of engineering physics, chemistry, biology, and mathematics (up to Differential Equations I or Applied Engineering Analysis I). Students with deficiencies in the above courses will be required to satisfactorily complete selected courses as a condition of acceptance.
- A satisfactory score, as evaluated by the Admissions Committee for Biomedical Engineering, is required on the Graduate Record Examination (GRE). Students whose native language is not English must achieve a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) paper version or 79 on the Internet version. The applicant’s performance on a standardized test will be considered in addition to other criteria for admission or competitive scholarship awards and will not be used as the sole criterion for consideration of an applicant.
- Three letters of recommendation attesting to the applicant’s readiness for graduate study.
- A complete application includes the application form, official transcripts, letters of recommendation, GRE scores, a résumé, and a statement of the applicant’s research experience, interests, and goals. TOEFL scores are required for those applicants whose native language is not English.

Degree Requirements and Program of Study – Thesis Option

Typically, a Master’s degree program of study will consist of at least 32 semester credit hours beyond the bachelor’s degree. Undergraduate courses, general education courses, and prerequisites for graduate courses cannot be counted toward this total. For transferring students, course credit allowed for transfer will be decided on a case-by-case basis by the Biomedical Engineering Committee on Graduate Studies (COGS). If recommended by the COGS, the request will then be submitted to the Dean of the Graduate School for approval. Since this is a joint graduate program, some courses are offered at The University of Texas Health Science Center at San Antonio (UTHSCSA). To enroll in UTHSCSA courses (UTHSCSA Catalog [http://catalog.uthscsa.edu]), students must register through the UTHSCSA Web site (http://www.uthscsa.edu). Any questions concerning registration at UTHSCSA should be directed to the BME Program Office at UTHSCSA. The required curriculum for all students in the Thesis Option is as follows:

A. Core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 6033</td>
<td>BME Engineering Analysis</td>
</tr>
<tr>
<td>BME 6703</td>
<td>Biomedical Imaging</td>
</tr>
<tr>
<td>BME 6803</td>
<td>Experimental Biomechanics</td>
</tr>
<tr>
<td>BME 6903</td>
<td>Biomaterials</td>
</tr>
</tbody>
</table>

Required Core Courses offered at UTHSCSA:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIME 6090</td>
<td>Biomedical Engineering Analysis</td>
</tr>
<tr>
<td>BIME 6004</td>
<td>Biology for Bioengineers</td>
</tr>
<tr>
<td>BIME 6006</td>
<td>Physiology for BME</td>
</tr>
<tr>
<td>TSCI 5070</td>
<td>Responsible Conduct of Patient-Oriented Clinical Research</td>
</tr>
</tbody>
</table>

B. Research seminar

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 6011</td>
<td>(or BIME 6090 at UTHSCSA) is required for three semesters, in order to satisfy the requirements for the Master’s degree program in Biomedical Engineering.</td>
</tr>
</tbody>
</table>

C. Elective courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 5433</td>
<td>Neurophysiology</td>
</tr>
<tr>
<td>BIO 5483</td>
<td>Computational Neuroscience</td>
</tr>
<tr>
<td>BIO 5503</td>
<td>Sensory Physiology</td>
</tr>
<tr>
<td>BME 6053</td>
<td>Independent Study in Biomedical Engineering (or BME 6052, BME 6051)</td>
</tr>
<tr>
<td>BME 6093</td>
<td>Topics in Biomedical Engineering</td>
</tr>
<tr>
<td>BME 6111</td>
<td>Introduction to Clinical Practices</td>
</tr>
<tr>
<td>BME 6123</td>
<td>Medical Device Design</td>
</tr>
</tbody>
</table>
Department of Biomedical Engineering

BME 6143 Biomedical Device Development
BME 6203 Physiology for Engineers
BME 6213 Cellular Engineering
BME 6223 Transport Processes in Biological Systems
BME 6233 Cardiovascular Bioengineering
BME 6243 Mechanobiology
BME 6253 Bioheat Transfer
BME 6313 Computational Bioengineering and Biomedicine
BME 6323 Bioinformatics
BME 6333 Stochastic Modeling in Bioengineering
BME 6343 Statistical Pattern Recognition and Data Mining in Biomedical Engineering
BME 6353 Computational Methods in Mass Spectrometry
BME 6363 Multiscale Computational Modeling of Biomedical Systems
BME 6523 Biological Laboratory Techniques in Biomedical Engineering
BME 6723 Bioinstrumentations
BME 6733 Microfabrication and Application
BME 6743 Biophotonics
BME 6753 Biosensors: Fundamentals and Applications
BME 6793 Topics in Image and Signal Processing
BME 6823 Advanced Biomechanics
BME 6843 Tissue Mechanics
BME 6863 Mechanical Behavior of Living Tissues
BME 6873 Biofluid Mechanics
BME 6893 Topics in Biomechanics
BME 6913 Biomaterials II
BME 6923 Tissue Engineering
BME 6933 Tissue-Biomaterials Interactions
BME 6943 Biomaterials and Cell Signaling
BME 6953 Biomaterials for Drug-Delivery/Pharmacology
BME 6963 Fundamentals to Polymer Science with Select Biomedical Applications
BME 6973 Current Analytical Tools for Biomaterials Characterizations
BME 6993 Topics in Biomaterials
CHE 5263 Advanced Analytical Chemistry
EE 5243 Topics in Systems and Control
EE 5263 Topics in Digital Signal Processing and Digital Filtering
EE 5353 Topics in Multimedia Signal Processing
EE 6343 Advanced Topics in Systems and Control
EE 6363 Advanced Topics in Signal Processing
ME 5013 Topics in Mechanical Engineering
ME 5243 Advanced Thermodynamics
ME 5413 Elasticity
ME 5463 Fracture Mechanics
ME 5473 Viscoelasticity
ME 5483 Finite Element Methods
ME 5613 Advanced Fluid Mechanics
ME 5653 Computational Fluid Dynamics
ME 5713 Mechanical Behavior of Materials
ME 5743 Composite Materials
MOT 5163 Management of Technology
MOT 5243 Essentials of Project and Program Management
MOT 5253 Starting the High-Tech Firm
MOT 5313 Emerging Technologies
MOT 5323 Biotechnology Industry
STA 5103 Applied Statistics

UTHSCSA Prescribed Elective Courses:
BIME 5091 Independent Study
CSBL 5022 Interprofessional Human Gross Anatomy
CSBL 5095 Experimental Design and Data Analysis
INTD 5007 Advanced Cell and Molecular Biology
INTD 5040 Fundamentals of Neuroscience
INTD 6033 Cell Signaling Mechanisms
INTD 7074 Medical Product Development
MICR 5051 Introduction to Immunology
PHAR 5013 Principles of Pharmacology
RADI 6016 Physics of Diagnostic Imaging II
RADI 6051 Statistical Parametric Imaging

D. A minimum of 6 semester credit hours of biomedical engineering Master's Thesis Research is required.
BIME 6098 Thesis
BME 6986 Master's Thesis Research

Total Credit Hours 32

1 Only one course is needed to satisfy the core requirement.

The entire program of study must be recommended by the student’s Master’s Thesis Advisor, Master’s Thesis Committee, and the COGS and must be submitted to the Dean of the Graduate School for approval. The courses taken by students are intended to focus and support the individual’s mastery of his or her particular area of specialization.

Advancement to Candidacy
The student should seek recommendations from the COGS for advancement to candidacy. The COGS reserves the right to deny recommendation of the student’s admission to Master’s candidacy based on the student’s academics and proposed research. Upon recommendation from the COGS, all students are admitted to candidacy after successfully defending their proposed research, recommended by his/her Master’s Thesis Committee, and approved by the Dean of the Graduate School. Students should also consult the University Master’s Degree Regulations in Chapter 4 of this catalog for the other pertinent requirements.

Thesis Defense
A thesis, which is an original contribution to scholarship, based on independent investigation (graduate research) in the major area, is required of every candidate. The Master’s thesis research will be conducted by the student under the guidance of the Supervising Professor and the advice of the Master’s Thesis Committee. Prior to starting the thesis research, each student will submit a research proposal to the COGS for approval. The thesis will be the responsibility of the student and the Supervising Professor. Registration for thesis credit hours must be for a period of more than one semester. During each semester that a student receives advice and/or assistance from a faculty member or supervision by the Master’s Thesis Committee or uses UTSA
or UTHSCSA resources, he or she will be required to enroll for credit in the appropriate Master’s degree course. The form and format of the thesis should follow the guidelines and rules already in effect at UTSA or UTHSCSA.

**Composition of the Master’s Thesis Committee**

The Master’s Thesis Committee is made up of at least four members. The committee should consist of the Supervising Professor, one BME Graduate Faculty member from UTSA, one BME Graduate Faculty member from UTHSCSA, and one external member. The student’s thesis proposal and the proposed composition of the Master’s Thesis Committee will be evaluated and approved by the COGS.

**Final Oral Examination (Defense of Thesis)**

A satisfactory final oral examination is required for the approval of a thesis. Acceptance of the thesis will be contingent upon approval of the respective Master’s Thesis Committee. The thesis defense consists of a seminar presentation by the candidate to the general public. A closed door examination by the Master’s Thesis Committee follows and covers the general field of the thesis, and other parts of the student’s program as determined by the respective committee. Members of the Master’s Thesis Committee must be satisfied that the student has:

1. Completed the research approved by the Master’s Thesis Committee.
2. Passed all examinations required by the COGS, including the successful defense of the thesis.
3. Completed the required coursework.
4. Completed a thesis that is an independent investigation in the biomedical engineering field and constitutes a contribution to the respective discipline.

Upon successful completion of the aforementioned requirements, the Master’s Thesis Committee members will sign the approval forms for the Graduate School at UTSA that the Master’s degree be awarded.

**Degree Requirements and Program of Study – Nonthesis Option**

The Nonthesis Option is not offered to new incoming students. All students enrolled in the Nonthesis Option will require approval from the Program Director and the Graduate Advisor of Record. Typically, a Master’s degree (Nonthesis Option) program of study will consist of at least 36 semester credit hours beyond the bachelor’s degree. Undergraduate courses, general education courses, and prerequisites for graduate courses cannot be counted toward this total. For transferring students, course credit allowed for transfer will be decided on a case-by-case basis by the Biomedical Engineering Committee on Graduate Studies (COGS). If recommended by the COGS, the request will then be submitted to the Dean of the Graduate School for approval. Since this is a joint graduate program, some courses are offered at The University of Texas Health Science Center at San Antonio (UTHSCSA). To enroll in UTHSCSA courses (UTHSCSA Catalog [http://catalog.uthscsa.edu]), students must register through the UTHSCSA Web site [http://www.uthscsa.edu]). Any questions concerning registration at UTHSCSA should be directed to the BME Program Office at UTHSCSA. The required curriculum for all BME students in the Nonthesis Option is as follows:

<table>
<thead>
<tr>
<th>A. Core Courses:</th>
<th>18</th>
</tr>
</thead>
</table>

**Required Core Courses offered at UTSA:** (All courses listed below.)

- BME 6013 Biomedical Imaging
- BME 6131 Biomedical Project
- BME 6703 Biomedical Imaging
- BME 6803 Experimental Biomechanics
- BME 6903 Biomaterials
- BME 6961 Comprehensive Examination

Required Core Courses offered at UTHSCSA: (1 Only one of these courses is needed for the core requirement.)

- BIME 6004 Biology for Bioengineers
- BIME 6006 Physiology for BME
- TSCI 5070 Responsible Conduct of Patient-Oriented Clinical Research

**B. Research seminar**

- BME 6011 (or BIME 6090 at UTHSCSA) is required for three semesters, in order to satisfy the requirements for the Master’s degree program in Biomedical Engineering.

**C. A minimum of 15 semester credit hours of Elective Courses**

15 Courses from this list may be taken with the approval of the Program Director, Supervising Professor, and course instructor.

| Total Credit Hours | 36 |

1 Students are required to take only one of these courses to satisfy the core requirements.

**Doctor of Philosophy Degree in Biomedical Engineering**

A Doctor of Philosophy degree in Biomedical Engineering (BME) at The University of Texas at San Antonio (UTSA) is offered through a joint graduate program with The University of Texas Health Science Center at San Antonio (UTHSCSA). A matrix of academic tracks is offered based on segments of biomedical engineering and/or areas of clinical emphasis. Specifically, the program has emphases in the following areas: biomaterials, biomechanics, and bioimaging. The biological areas covered are orthopedics/dental tissues, cardiovascular systems, and neural systems. The Ph.D. in Biomedical Engineering will be awarded to candidates who have displayed an in-depth understanding of the concepts that are necessary for critically judging the scientific literature, for formulating novel hypotheses, designing experimental protocols to test the hypotheses, interpreting their results and demonstrating their ability to make an original contribution to knowledge in the biomedical field.

The regulations for this degree comply with the general University regulations (refer to Chapter 2, General Academic Regulations, and Chapter 5, Doctoral Degree Regulations).

**Admission Requirements**

Students who hold an undergraduate or master’s degree may apply to the program. The minimum requirements for admission to the Doctor of Philosophy in Biomedical Engineering degree program are described below. Note that admission is competitive and satisfying these requirements does not guarantee admission.

- Applicants must have a grade point average of 3.0 or better in the last 60 semester credit hours of coursework with a major in a recognized science or engineering discipline. All students should have had sufficient background in engineering, chemistry, biology, and physics.
prior to being admitted to the program. It is expected that these students will have B.S. degrees with emphasis in either engineering, physical science, or biological science disciplines. All students are required to have completed at least one year of engineering physics, chemistry, biology, and mathematics (up to Differential Equations I or Applied Engineering Analysis I). Students with deficiencies in the above courses will be required to satisfactorily complete selected courses as a condition of acceptance.

- Applicants with a master’s degree must have a grade point average of 3.0 or better in their master’s degree program. Applicants with a Master’s degree in Biomedical Engineering or in a related field may apply a maximum of 30 semester credit hours of previously earned graduate credit (except research and thesis hours) toward their doctoral degree. The Committee on Graduate Studies (COGS) will evaluate each student’s transcript and credit will be recommended for transfer on a course-by-course basis to satisfy the formal coursework requirements of the doctoral degree.

- A satisfactory score, as evaluated by the Admissions Committee for Biomedical Engineering, is required on the Graduate Record Examination (GRE). Students whose native language is not English must achieve a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) paper version or 79 on the Internet version. The applicant’s performance on a standardized test will be considered in addition to other criteria, for admission or competitive scholarship awards and will not be used as the sole criterion for consideration of an applicant.

- Three letters of recommendation attesting to the applicant’s readiness for doctoral study.

- A complete application includes the application form, official transcripts, letters of recommendation, GRE scores, a résumé, and a statement of the applicant’s research experience, interests, and goals. TOEFL scores are required for those applicants whose native language is not English.

Degree Requirements and Program of Study

Typically, a doctoral program of study will consist of at least 82 semester credit hours for students with a bachelor’s degree. Undergraduate courses, general education courses, and prerequisites for graduate courses cannot be counted toward this total. For students with a master’s degree, course credit allowed for transfer will be decided on a case-by-case basis by the Biomedical Engineering COGS. If recommended by the COGS, the request will then be submitted to the Dean of the Graduate School for approval. Since this is a joint graduate program, the request will then be submitted to the Dean of the Graduate School for approval. The Committee on Graduate Studies (COGS) will evaluate each student’s transcript and credit will be recommended for transfer on a course-by-course basis to satisfy the formal coursework requirements of the doctoral degree.

Students with a M.S. degree in Biomedical Engineering will be reviewed on a case-by-case basis. All other students who have obtained a Master of Science degree in Biomedical Engineering from UTSA are required to complete the following courses:

- CSBL 5095  Experimental Design and Data Analysis (at UTHSCSA)
- One prescribed BME elective
- Course requirements in Sections B and D of doctoral program

Students will be required to complete a minimum of 82 hours for students matriculating into the doctoral program with a B.S. degree. The minimum required curriculum for all students is as follows:

### A. Core Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Core Courses offered at UTSA:</td>
<td>16</td>
</tr>
<tr>
<td>BME 6033  BME Engineering Analysis ¹</td>
<td></td>
</tr>
<tr>
<td>BME 6203  Physiology for Engineers ¹, ²</td>
<td></td>
</tr>
<tr>
<td>BME 6703  Biomedical Imaging ¹, ³</td>
<td></td>
</tr>
<tr>
<td>BME 6803  Experimental Biomechanics</td>
<td></td>
</tr>
<tr>
<td>BME 6903  Biomaterials ¹</td>
<td></td>
</tr>
<tr>
<td>Required Core Courses offered at UTHSCSA:</td>
<td></td>
</tr>
<tr>
<td>BIME 6004  Biology for Bioengineers ¹, ²</td>
<td></td>
</tr>
<tr>
<td>BIME 6006  Physiology for BME ¹, ²</td>
<td></td>
</tr>
<tr>
<td>CSBL 5095  Experimental Design and Data Analysis</td>
<td></td>
</tr>
<tr>
<td>TSCI 5070  Responsible Conduct of Patient-Oriented Clinical Research</td>
<td></td>
</tr>
<tr>
<td>RADI 5015  Physics of Diagnostic Imaging ¹, ³</td>
<td></td>
</tr>
</tbody>
</table>

[1] Only one of these courses may be counted toward the core requirements.

[2] Only one of these courses may be counted toward the core requirements.

[3] Only one of these courses may be counted toward the core requirements.

### B. Research seminar

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 6011 (at UTSA) or BIME 6090 (at UTHSCSA) must be registered for during each Fall and Spring semester while in the BME Doctoral program. With the approval of the Program Director, Ph.D. students are not required to register for the seminar if they are in their fifth year of the program as a full-time student and have registered for the Fall and Spring semester seminars during the preceding four years.</td>
<td>8</td>
</tr>
</tbody>
</table>

### C. A minimum of 9 semester credit hours of Prescribed Elective Courses selected from the list below. Courses from this list may be taken with the approval of the Program Director, Supervising Professor, and course instructor.

- UTSA Prescribed Elective Courses:
  - BIO 5433  Neurophysiology
  - BIO 5483  Computational Neuroscience
  - BIO 5503  Sensory Physiology
  - BME 6043  Critical Thinking and Writing for BME
  - BME 6053  Independent Study in Biomedical Engineering (or BME 6051, BME 6052)
  - BME 6093  Topics in Biomedical Engineering
  - BME 6111  Introduction to Clinical Practices
  - BME 6123  Medical Device Design
  - BME 6143  Biomedical Device Development
  - BME 6213  Cellular Engineering
  - BME 6223  Transport Processes in Biological Systems
  - BME 6233  Cardiovascular Bioengineering
  - BME 6243  Mechanobiology
  - BME 6253  Bioheat Transfer
  - BME 6313  Computational Bioengineering and Biomedicine
  - BME 6323  Bioinformatics
  - BME 6333  Stochastic Modeling in Bioengineering
BME 6343  Statistical Pattern Recognition and Data Mining in Biomedical Engineering
BME 6353  Computational Methods in Mass Spectrometry
BME 6363  Multiscale Computational Modeling of Biomedical Systems
BME 6523  Biological Laboratory Techniques in Biomedical Engineering
BME 6723  Biointerfaces
BME 6733  Microfabrication and Application
BME 6743  Biophotonics
BME 6753  Biosensors: Fundamentals and Applications
BME 6793  Topics in Image and Signal Processing
BME 6823  Advanced Biomechanics
BME 6843  Tissue Mechanics
BME 6863  Mechanical Behavior of Living Tissues
BME 6873  Biofluid Mechanics
BME 6893  Topics in Biomechanics
BME 6913  Biomaterials II
BME 6923  Tissue Engineering
BME 6933  Tissue-Biomaterials Interactions
BME 6943  Biomaterials and Cell Signaling
BME 6953  Biomaterials for Drug-Delivery/Pharmacology
BME 6963  Fundamentals to Polymer Science with Select Biomedical Applications
BME 6973  Current Analytical Tools for Biomaterials Characterizations
BME 6993  Topics in Biomaterials
CHE 5263  Advanced Analytical Chemistry
EE 5243  Topics in Systems and Control
EE 5263  Topics in Digital Signal Processing and Digital Filtering
EE 5353  Topics in Multimedia Signal Processing
EE 6343  Advanced Topics in Systems and Control
EE 6363  Advanced Topics in Signal Processing
ME 5013  Topics in Mechanical Engineering
ME 5243  Advanced Thermodynamics
ME 5413  Elasticity
ME 5463  Fracture Mechanics
ME 5473  Viscoelasticity
ME 5483  Finite Element Methods
ME 5613  Advanced Fluid Mechanics
ME 5653  Computational Fluid Dynamics
ME 5713  Mechanical Behavior of Materials
ME 5743  Composite Materials
STA 5103  Applied Statistics
UTHSCSA Prescribed Elective Courses:
BIME 5091  Independent Study
CSBL 5022  Interprofessional Human Gross Anatomy
IBMS 5000  Fundamentals of Biomedical Science
INTD 5007  Advanced Cell and Molecular Biology
INTD 5040  Fundamentals of Neuroscience I
INTD 6033  Cell Signaling Mechanisms
INTD 7074  Medical Product Development

MICR 5051  Introduction to Immunology
PHAR 5013  Principles of Pharmacology
PHAR 5014  Integrated Physiology and Therapeutics
RADI 6016  Physics of Diagnostic Imaging II
RADI 6051  Statistical Parametric Imaging

D. Supervised Teaching
A minimum of 1 semester credit hour of Supervised Teaching is required to satisfy the degree's requirement. Students may take up to 3 semester credit hours. (1-3 semester credit hours)
BME 6023  Supervised Teaching (or BME 6022, BME 6021)
BIME 6071  Supervised Teaching

E. Doctoral Research and Dissertation
1. Doctoral Research requires a minimum of 6 semester credit hours.
BME 7951  Doctoral Research
BME 7952  Doctoral Research
BME 7953  Doctoral Research
BME 7956  Doctoral Research
BME 6097  Research
2. Doctoral Dissertation requires a minimum of 6 semester credit hours.
BME 7991  Doctoral Dissertation
BME 7992  Doctoral Dissertation
BME 7993  Doctoral Dissertation
BME 7996  Doctoral Dissertation
BIME 7099  Dissertation

F. Electives
The remainder of the required hours must be BME approved graduate level electives. (34-36 semester credit hours).
Students in the program must complete at least 82 semester credit hours for graduation. The entire program of study must be recommended by the student's Dissertation Advisor, Dissertation Committee, and COGS and must be submitted to the Dean of the Graduate School for final approval. The courses taken by students are intended to focus and support the individual's mastery of his or her particular area of specialization.

Total Credit Hours 82

Advancement to Candidacy
All students seeking a doctoral degree must be admitted to candidacy after passing a doctoral qualifying examination. Students should consult the University Doctoral Degree Regulations in Chapter 5 of this catalog for the other pertinent requirements.

Satisfactory Performance on the Doctoral Qualifying Examination for Admission to Candidacy
The qualifying examination will be administered before the student commences the chosen dissertation research. This examination will be comprehensive in nature and may be written, oral, or both. Topics covered will include not only information provided in courses taken by the student but also basic knowledge necessary for research in the student's chosen area of study. The Committee on Graduate Studies (COGS) will determine the format of the examination and the composition of the Qualifying Examination Committee (QEC), with the provision that BME faculty from both UTSA and UTHSCSA will be included. The QEC will
administer the examination, evaluate the student's performance, and report its judgment to the Committee on Graduate Studies. A student is allowed to take the qualifying examination twice. Admission to candidacy will be contingent on passing the qualifying examination. Students who do not pass the qualifying examination may be accommodated with a terminal Master's degree after completing additional prescribed courses and/or research approved by the Supervising Professor, Program Director and the COGS.

**Doctoral Dissertation**

A dissertation, which is an original contribution to scholarship, based on independent investigation (doctoral research) in the major area, is required of every candidate. The doctoral research will be conducted by the student under the guidance of the Supervising Professor and the advice of the Dissertation Committee. Prior to starting the doctoral research, each student will submit a dissertation proposal to the COGS for approval. The doctoral dissertation will be the responsibility of the student and the Supervising Professor. Registration for dissertation credit hours must be for a period of more than one semester. During each semester that a student receives advice and/or assistance from a faculty member or supervision by the Dissertation Committee or uses UTSA or UTHSCSA resources, he or she will be required to enroll for credit in the appropriate dissertation course. The form and format of the dissertation should follow the guidelines and rules already in effect at UTSA or UTHSCSA.

**Composition of the Dissertation Committee**

The Dissertation Committee is made up of at least five members. The committee should consist of the Supervising Professor, one BME Graduate Faculty member from UTSA, one BME Graduate Faculty member from UTHSCSA, one member of the graduate faculty outside of the BME Graduate Faculty from either UTSA or UTHSCSA, and one member from outside both institutions. In addition, there is a minimum of 50 percent dissertation committee membership from UTSA for students with a Supervising Professor from UTSA. The student’s dissertation proposal and the proposed composition of the Dissertation Committee will be evaluated and approved by the COGS.

**Final Oral Examination (Defense of Dissertation)**

A satisfactory final oral examination is required for the approval of a dissertation. Acceptance of the dissertation will be contingent upon approval of the respective Dissertation Committee.

The dissertation defense will consist of a seminar presentation by the candidate to the general public. A closed door examination by the Dissertation Committee follows and covers the general field of the dissertation, and other parts of the student’s program as determined by the respective committee. Members of the Dissertation Committee must be satisfied that the student has:

1. Completed the research approved by the Dissertation Committee.
2. Passed all examinations required by the COGS, including the successful defense of the dissertation.
3. Completed the required coursework.
4. Completed a dissertation that is an independent investigation in the biomedical engineering field and constitutes a contribution to the respective discipline.
5. Submitted an abstract for publication in Dissertation Abstracts International that meets with the approval of University requirements.

Upon successful completion of the aforementioned requirements, the Dissertation Committee members will sign the approval forms for the doctoral dissertation and make an official recommendation to the Graduate School of Biomedical Sciences at the UTHSCSA or to the Graduate School at UTSA that the Doctoral degree be awarded.

Students should note that the above is a summary of the requirements for the Doctoral degree and are advised to consult the University (UTSA) Doctoral Degree Regulations as well as the BME Student Handbook which contains details specific to the UTSA/UTHSCSA Joint Graduate Program in Biomedical Engineering.