



2017-2018

Program, Policies, and Guidelines

Joint Graduate Program in Biomedical Engineering
University of Texas at San Antonio
University of Texas Health Science Center at San Antonio
Graduate Program for M.S. Degree and Ph.D. Degree

Graduate School of Biomedical Sciences
University of Texas Health Science Center at San Antonio

BME program policies and guidelines are in compliance with those established by the UT System (<http://www.utsystem.edu/>) Board of Regents (<http://www.utsystem.edu/bor/rules/>), the UT Health San Antonio (<http://www.uthscsa.edu/hop2000/>), and the Graduate School of School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>). The *Catalog* (<http://catalog.uthscsa.edu/>) of UT Health San Antonio provides general information and regulations that relate to students. In the event of discrepancies between BME program policies/guidelines and those established by UT governing components, those described by the governing components will prevail.

The policies of the BME Program are regularly reviewed and updated; therefore, this copy may not be the most current.

Accreditation

In 2010, UTSA completed the requirements for reaffirmation of its accreditation. The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) accredits UTSA to award bachelors, masters, and doctoral degrees. In early 2011, UTSA received official notice of reaffirmation of accreditation from the SACSCOC President, Dr. Belle Wheelan.

The UT Health San Antonio is accredited at Level VI by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS), 1866 Southern Lane, Decatur, GA 30033-4097, to award certificates and baccalaureate, master's, doctoral and professional degrees. UT Health San Antonio was most recently reviewed and fully reaffirmed by SACS in 2008. This accreditation includes all programs offered at the institution and extends through 2018 with an interim five year review completed in March 2014.

The Graduate School of Biomedical Sciences is reviewed by the Texas Higher Education Coordinating Board (THECB), 1200 E. Anderson Lane, Austin, TX 78752, on a statewide review schedule. The Joint Graduate Program in BME, by itself, does not undergo external review by an individual discipline accrediting body; rather it is reviewed as part of the portfolio of doctoral programs in the GSBS. *This THECB-mandated review is in accordance with the requirements of SACS that public institutions of higher education have a process to "review the quality and effectiveness of existing programs and for continuous improvement."*

The last external review of the Joint Graduate Program in BME was published on January 25, 2016.

The Joint Graduate Program was approved by the Texas Higher Education Coordinating Board in February 2003, and our first batch of students matriculated in the fall 2003 semester.

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Important Notes for Students Navigating Two University Settings Simultaneously

While the multidisciplinary, two-campus educational partnership you have embarked upon is exciting, it can also be confusing and at times frustrating. This handbook provides a lot of the information you need to successfully navigate the administrative infrastructure on both campuses. However, it is not totally comprehensive.

Disclaimer

The information contained in this handbook does not constitute a contract, expressed or implied, between any applicant, student, or faculty member and the Joint UTSA/UT Health San Antonio Program in Biomedical Engineering. The Joint Program in Biomedical Engineering reserves the right to alter course offerings at any time, or change the curriculum or any other procedures leading to the awarding of a degree and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine. The changes will apply to prospective students and may apply to those already enrolled in the Program.

Revisions

Recommendations for improving the content of this handbook are welcomed from the students and any members of the faculty of the Joint UTSA/UT Health San Antonio Program in Biomedical Engineering.

Program Overview

The University of Texas at San Antonio (UTSA) and UT Health San Antonio jointly offer M.S. and Ph.D. degrees in Biomedical Engineering (BME). The objective of the Joint Graduate Program is to train students in the use of basic biomedical engineering approaches for the investigation of fundamental bioengineering questions associated with the diagnosis and treatment of human diseases. The educational goals of this program are founded on the belief that the basic scientific and engineering approaches are critical to the fundamental understanding of human health and the treatment of disease.

The Joint Graduate Program is designed to build on the scientific interactions and cooperation between the basic science and clinical faculty at UT Health San Antonio and the engineering and basic science faculty at UTSA. It is felt that this distinctive type of research environment offers the students maximum opportunity to develop into well-rounded, competitive biomedical engineering professionals. Because engineers, scientists and clinicians participate in the education and training of each student, graduates from this program would be uniquely trained in the fundamental sciences and engineering related to medicine. The Joint Graduate Program has outstanding faculty, many of whom are leaders in their respective fields, nationally and internationally recognized.

Summary and Outlook for the Future

The Joint Graduate Program in BME has enjoyed great success. Talented and productive faculty members from both institutions have embraced the program since its inception, and interest among the faculty continues to grow. Collaborations between faculty members at the two

institutions are expected to continue to develop and expand. The Joint Graduate Program has attracted well-qualified students from not only local institutions (San Antonio and Texas), but also institutions across the United States and internationally. More active recruitment of students continues, and it is expected that the caliber of our matriculating students will increase as a result. Both the students and faculty bring new ideas and additional energy to the developing biomedical industry in San Antonio and South Texas. This Joint Graduate Program has benefited institutions through the production of joint patents, publications, and increased extramural research funding. The activities provided through this Joint Graduate Program have enhanced the visibility of both institutions as the biotechnology industries continues to grow in the city, state, and nation.

Program Purpose

In line with UTSA's and UT Health San Antonio's strategic plans and as well as UTSA's College of Engineering and UT Health San Antonio's Graduate School of Biomedical Sciences strategic plans, the goals of the program are to:

- Attract and retain top quality students while maintaining cultural diversity;
- Provide an infrastructure that enhances student success in graduation rates through supplemental education, advisement and mentoring;
- Provide curricula that serve the needs of our constituents;
- Facilitate meaningful internships and co-op programs that enhance the value of classroom education;
- Expose students to research as a means of enriching their learning experience and promoting graduate education;
- Promote excellence in both teaching and administrative support.

Brief history of program

The history of the Ph.D. degree in Biomedical Engineering and its relationship to UTSA's strategic plan

The Joint M.S. and Ph.D. degrees in BME was approved by the THECB in 2003. This Joint Graduate Program was launched as a ground-breaking program, with much collaboration and infrastructure planning. Core faculty was appointed in early 2003, and it was determined by the core faculty that the Ph.D. degree program will be first offered to applicants in the fall 2003 semester. Core courses to be taught in the first semester were also established by the core faculty prior to the review of the first year's Ph.D. applications. In fall 2003, the Joint Graduate Program admitted its first Ph.D. class of 11 students. Dually-enrolled, all students took their courses either at the UTSA and/or the UT Health San Antonio campus. No duplicate courses are offered at either the UTSA or the UT Health San Antonio campus, and such offerings allow our

students the opportunity to be exposed to the many diverse educational and research experiences at both campuses.

Without an initial department to house the Joint Graduate Program and since the UTSA catalog was published before the approval of the program, all BME courses were initially given the Mechanical Engineering (ME) prefix. This ME prefix was later changed to a BME prefix when UTSA established its BME department in early 2006. The current UTSA graduate catalog lists the BME core courses, prescribed electives and free electives. In addition, new BME courses are continuously being added or modified as new faculty members are being added to the Joint Graduate Program and the BME department. As such, changes to courses offered in the BME program will also be reflected every two years when the new catalog is effective. All newly added or modified courses, program policy and information pertaining to student successes will also be continuously updated on the Joint Graduate Program website.

[The history of the Master of Science degree in Biomedical Engineering and its relationship to UTSA's strategic plan](#)

Approved in 2003 by the THECB, together with the Joint Ph.D. Program in Biomedical Engineering, the Joint M.S. Program began accepting its first batch of students in fall 2007. Of the eight students accepted, five of them ultimately enrolled for that semester. Like the Joint Ph.D. Program in Biomedical Engineering, students in the Joint M.S. Program are dually-enrolled at UTSA and UT Health San Antonio and thus allowing the students to have similar educational and research opportunities at both institutions.

[Reporting/administrative structure](#)

The Deans of the Graduate School and College of Engineering at UTSA and the Dean of the Graduate School of Biomedical Sciences at UT Health San Antonio have overall responsibilities for the Joint Graduate Program in Biomedical Engineering. The graduate faculty of the Biomedical Engineering program, along with the Program Director and Associate Program Director are responsible for curriculum development and ongoing missions of the program.

The Program Director and Associate Program Director advise all graduate students, maintain records, and represent the program. The day-to-day administrative operation of the BME Program is the responsibility of the Program Director, Associate Director, and the Chair of the Committee on Graduate Studies (COGS), a position held by Associate Program Director. The COGS advises and makes recommendations to the Program Director and Associate Director on all educational aspects of the program.

The composition of the COGS for the BME Program consists of the BME program faculty. However, UTSA and UT Health San Antonio should each be represented by at least three members. The COGS meeting is chaired by the Associate Program Director. The Program Director and Associate Program Director serve as non-voting members of COGS and can jointly cast a final deciding vote if needed. The COGS is responsible for the development and modification of BME program policies, processes, courses, companion procedure and operations manuals or guidelines to implement the requirements of the BME Graduate Student

Administration Agreement. Addenda are reviewed regularly by COGS and updated by COGS as needed.

The Joint Graduate Program is supervised by a COGS that is currently composed of all BME Program faculty (both Core and Associated) members. These program faculty members are also on the Graduate Faculty at either UTSA or UT Health San Antonio or both. From this COGS membership, subcommittee Chairs are elected to lead various programmatic activities for which the COGS is responsible, such as recommending student admission to the program, overseeing academic curricula, monitoring student progress in the program, and attesting eligibility for admission to candidacy for a degree. Recommendations are made by these subcommittees to the COGS, which then advises the Program Director and Associate Program Director for implementation and/or, if warranted, seeking the Graduate Deans for final approval.

Program direction, overview, and student success is jointly managed by the Program Director and the Associate Program Director, who report directly to the Deans of the College of Engineering and the Graduate School at UTSA, and the Dean of the Graduate School of Biomedical Sciences at UT Health San Antonio. Per the MOU agreement, all three Deans solicit nominations from the BME graduate faculty for the Program Director and Associate Program Director positions. The Dean of the Graduate School of Biomedical Sciences at UT Health San Antonio and the Deans of the College of Engineering and the Graduate School at UTSA confirm and appoint the Program Director and Associate Program Director for a period of three years. Upon the expiration of terms, the Biomedical Engineering Program faculty elects a new Program Director and Associate Director every three years. After each election, the credentials of both newly elected Directors are forwarded to the Deans for final approval.

[Alignment of program with institutional mission/goals](#)

The UTSA is dedicated to the advancement of knowledge through research and discovery, teaching and learning, community engagement and public service. As an institution of access and excellence, UTSA embraces multicultural traditions and serves as a center for intellectual and creative resources as well as a catalyst for socioeconomic development and the commercialization of intellectual property for Texas, the nation and the world. To be a premier public research university, UTSA provides access to educational excellence and prepares citizen leaders for the global environment. An environment of dialogue and discovery is encouraged, where integrity, excellence, inclusiveness, respect, collaboration and innovation are fostered.

The mission of the UT Health San Antonio is to make lives better through excellence in education, research, health care and community engagement. Strategies for achieving this mission include 1) educating a diverse student body to become excellent health care providers and scientists; 2) engaging in research to understand health and disease; 3) commercializing discoveries, as appropriate, to benefit the public; 4) providing compassionate and culturally proficient health care; 5) engaging our community to improve health; and 6) influencing thoughtful advances in health policy. The Graduate School of Biomedical Sciences at UT Health San Antonio provides an individualized, diverse and multidisciplinary learning environment for

students to develop the knowledge, skills and creativity to succeed in the evolving biomedical space.

Faculty and Academic Equal Opportunity/Affirmative Action Office: The mission of the Faculty and Academic EO/AA Office is to insure that every member of the Health Science Center (HSC) community, individuals seeking employment or an education, and individuals who wish to participate in a benefit from programs and activities offered by the HSC are afforded equal opportunity and freedom from all forms of discrimination that may violate their civil rights and other protections afforded them by the State of Texas, the University of Texas System and the UT Health San Antonio.

The UTSA's Commitment: Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681) is a federal law that prohibits discrimination based on gender in educational institutions which receive federal financial assistance. Title IX also prohibits sexual harassment, which includes sexual assault and sexual violence. Please see the following links:

<https://www.utsa.edu/eos/titleix.html>

<http://www.utsa.edu/eos/policy.html>

<http://catalog.utsa.edu/informationbulletin/administrativepoliciesandprocedures/studentgrievances/>

The UT Health San Antonio's Commitment: The UT Health San Antonio is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UT Health San Antonio does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

Please see the following links:

<http://students.uthscsa.edu/titleix/>

<http://uthscsa.edu/eeo/director.asp>

<http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/grievances/>

Program Characteristics

Curriculum (sequence, courses, length, etc.)

As the Joint Graduate Program is multi- and inter-disciplinary, the program's curriculum is designed to provide a synergistic combination of formal courses, seminars, teaching opportunities, interactions with clinicians, and individualized biomedical engineering research experiences in the laboratories of the BME program faculty.

The present curriculum requires all PhD students to take 17 semester credit hours of core courses in 1) Responsible Conduct of Patient-Oriented Clinical Research, 2) Experimental Design and Data Analysis, and 3) any four of the following courses: Biomaterials, Experimental Biomechanics, Bioimaging/Physics of Diagnostic Imaging, BME Engineering Analysis, or Physiology for Bioengineers/Biology for Bioengineers. In addition, all students are also required to attend research seminars every semester while in the program, complete a minimum of 9 semester credit hours of prescribed electives, and a minimum of 15 semester credit hours of doctoral research, doctoral dissertation and supervised teaching.

The required and selected courses are intended to focus and support the student's mastery of a particular area of expertise. Throughout their graduate training, students have access to the bioengineering and biosciences laboratories at both UTSA and UT Health San Antonio. This provides a unique opportunity to have learning experiences in medical, dental, bioscience, and engineering environments.

Degree Requirements Ph.D.

Requirements for admission to candidacy:

Students seeking a doctoral degree from the Joint Ph.D. Program in BME must be admitted to candidacy. In order to be admitted to candidacy, the student must comply with the following requirements:

- Fulfilled the requirements for unconditional admission as a Ph.D. degree-seeking student in the Joint Ph.D. Program in BME, which entails the removal of any conditions assigned at the time of admission.
- Completed all required core courses in the Joint Ph.D. Program in BME and obtained satisfactory grades.
- Be in good standing with the Graduate School (minimum GPA of 3.0).
- Passed the qualifying examination as prepared by the Qualifying Exam Committee.
- Passed the research proposal defense and recommended for admission to candidacy by the Dissertation Research Committee.
- Submitted an updated program of study to the Graduate School.

Had satisfied the above requirements, be approved for admission to candidacy by the Dean of the Graduate School.

Requirements for the degree:

The following requirements must be satisfied for graduation with a Ph.D. degree in BME:

- **Residency Requirement:** A student must spend at least two consecutive semesters (fall and spring, summer Terms I and II and fall, or spring and summer Terms I and II) in residence as a full-time student. During the residency period, the student must be registered for a minimum of 9 semester credit hours each regular semester either at UTSA, at UT Health San Antonio, or at both institutions, and 6 semester credit hours during the summer semester.

- **Grade Point Average:** A cumulative grade point average of “B” (3.0 on a 4.0 scale) for courses taken at UTSA and UT Health San Antonio must be maintained in each of the following:
 1. Required core courses in the Joint Ph.D. Program in BME;
 2. All graduate elective courses; and
 3. Transferred grades from other institutions (other than UTSA and UT Health San Antonio) are not used in the computation of cumulative GPA.

- **Course Requirements:** The Ph.D. program in BME consists of at least 82 semester credit hours beyond the bachelor’s degree. Undergraduate courses, general education courses, and prerequisites for graduate courses are not counted toward this total. Course requirements are 17 semester credit hours of Required Core Courses, research seminars for every semester while in the program, a minimum of 9 semester hours of Prescribed Electives, and a minimum of 15 semester hours of Doctoral Dissertation, Doctoral Research, and Supervised Teaching.

- **Support Work:** In addition to courses and research in the field of specialization within Biomedical Engineering, support work will be performed by students to broaden or supplement the student’s preparation. Support work may consist of conference attendance, writing of abstracts and manuscripts, and presentations at national conferences. Additionally, as these students mature while in the program, support work can also be in the form of student mentoring, where these students are learning to become a research supervisor. In many of these instances, students may be given the opportunity to mentor and supervise Master’s level and undergraduate students in their research.

- **Language Proficiency:** Biomedical Engineering students are required to possess a competent command of English.

- **Transfer of Credits:** Students in the Joint Ph.D. Program in BME expected to complete all coursework at UTSA and/or UT Health San Antonio. Exceptions require approval of the Graduate Program Committee, the Graduate School, and the administrative office responsible for graduate education.

- **Undergraduate Credit:** Credits earned for undergraduate-level courses are not applied

towards the Joint Ph.D. Program in BME. At the recommendation of the Research

Advisor, Graduate Program Committee, or Admissions Committee, such courses may be taken to enhance a student's ability to successfully complete graduate courses or to provide the necessary knowledge to initiate a student's research.

- **Not Accepted:** Courses completed by correspondence or extension may not be applied towards the Joint Ph.D. Program in BME.
- **Completing the Degree:** Before admission to candidacy, the student's Program of Study is under the direction of the Program Director and Associate Program Director, Dissertation mentor, and the Graduate Advisor of Record. Upon admission to candidacy and the formation of the student's dissertation committee, the Program of Study comes under the purview of the Dissertation Committee, which reviews the proposed program of study. The final Program of Study, as approved by the COGS, is then recommended to the Dean of the Graduate School at corresponding institution (UTSA or UT Health San Antonio) where the student conducts his/her dissertation work for approval. Approval of the final Program of Study by the Dean of the Graduate School from the student's home institution is a degree requirement. All completed coursework included in the final Program of Study must have been taken within the preceding eight years. No more than 2 courses for which a grade of less than "C" can be earned while in the Joint Ph.D. Program in BME.
- **Qualifying Examinations:** All students seeking to become a candidate for the Joint Ph.D. Degree in BME must pass their research proposal defense as part of their qualifying examinations. The examinations are taken within the first year in the program.
- **Registration during Examination Semester(s):** Students must be registered during any semester in which they are taking required examinations.
- **Doctoral Candidacy:** Prior to admission to candidacy, the student must be admitted as a Ph.D. degree-seeking student in the Joint Ph.D. Program in BME, and any conditions assigned at the time of admission must be removed. The student must complete and obtain satisfactory grades in all required core courses in the Joint Ph.D. Program in Biomedical Engineering and has a minimum cumulative GPA of 3.0. The student must have passed the qualifying exam and their research proposal defense. Once recommended for admission to candidacy, the student must submit all the appropriate candidacy forms and an updated program of study to the Dean of the Graduate School for approval.
- **Dissertation Committee:** Upon admission to candidacy and in consultation with the research mentor, the student selects their supervising professor with that professor's consent. The supervising professor, who chairs the Dissertation Committee, must be a

member of the UTSA and/or UT Health San Antonio graduate faculty as well as a member of the BME Core faculty. Additional members of the Dissertation Committee are recommended by the supervising professor, in consultation with the student, to the Graduate Program Committee. Upon recommendation of the Graduate Program Committee (COGS), the Graduate School appoints the Dissertation Committee. The committee must consist of at least five members, including the supervising professor, who consults with other members of the committee as work proceeds. The five members must include the supervising professor and two BME program faculty members, (one from UTSA and another from UT Health San Antonio). Of the remaining two other members, one has to be from outside the BME program, and the other one member has to be from outside UTSA or UT Health San Antonio. For students whose supervising professor is at UTSA, dissertation committee has to be made up of at least 50% membership from UTSA. In addition to recommending the student's final Program of Study to the Graduate Program Committee and supervising the research and writing of the dissertation, the Dissertation Committee certifies to the Graduate School that all degree requirements have been fulfilled.

- **Doctoral Dissertation:** A dissertation is required of every candidate and must be an original contribution to scholarship, based on independent research investigation in the field of Biomedical Engineering. It must be approved by the Dissertation Committee. Registration for the dissertation 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 University resources, the student is required to be enrolled in the appropriate dissertation course.

- **Final Oral Examination (Defense of Dissertation):** A satisfactory final oral examination is required for the approval of a dissertation. After the Dissertation Committee makes a decision, which must be unanimous, to accept a dissertation for examination, the student notifies the Graduate School and the Program at least three weeks in advance of the date of the final oral examination. In addition, the posting of the examination at least 3 weeks prior to the day of the examination, the student is also required to provide his/her dissertation to the committee members at least two weeks before the day of the examination. All defenses will be open to the public, followed by a closed door examination. The examination covers the dissertation and other parts of the student's program as determined by the Dissertation Committee. All members of the Dissertation Committee must be satisfied that the student has fulfilled the following:

1. Completed the work assigned by the Dissertation Committee;
2. Passed all examinations required by the program's Graduate Program Committee, including the final oral examination;
3. Completed a dissertation that is an independent investigation in BME, and that itself constitutes a contribution to a body of knowledge; and
4. Submitted an abstract for publication in Dissertation Abstracts International that meets with the approval of the Dissertation Committee.

Once the above is completed, the Dissertation Committee members sign the approval forms for the Doctoral dissertation and make an official recommendation to the Deans of the Graduate Schools from the corresponding institutions where their dissertation mentors are located that the Joint Ph.D. degree in BME be awarded. Approval from the Dissertation Committee must be unanimous.

- **Submission and Publication of Dissertation:** When the student has successfully defended the dissertation, he or she must arrange for its publication. Students submit the dissertation via ProQuest while coordinating submission and meeting deadlines provided by the Graduate School of their respective home institution.

Requirements for admission to candidacy: M.S. Thesis Option

The student should seek recommendations from the Graduate Program Committee for advancement to candidacy. The Graduate Program Committee reserves the right to deny recommendation of the student's admission to M.S. candidacy based on the student's academics and proposed research. A minimum GPA of 3.0 for all graduate courses is required. Upon recommendation from the Graduate Program Committee, all students are admitted to candidacy after successfully defending their proposed research, recommended by his/her M.S. Thesis Committee and approved by the Dean of the Graduate School.

Requirements for the degree:

The following requirements must be satisfied for graduation with a M.S. degree in Biomedical Engineering:

- **Grade Point Average:** A cumulative grade point average of "B" (3.0 on a 4.0 scale) for courses taken at UTSA and UT Health San Antonio must be maintained in each of the following:
 1. Required core courses in the Joint M.S. Program in Biomedical Engineering;
 2. All graduate elective courses; and
 3. Transferred grades from other institutions (other than UTSA and UT Health San Antonio) are not used in the computation of cumulative GPA.
- **Course Requirements:** The Joint M.S. program in Biomedical Engineering consists of at least 32 semester credit hours beyond the bachelor's degree. Undergraduate courses, general education courses, and prerequisites for graduate courses are not counted toward this total. Course requirements for thesis students are 17 semester credit hours of required core courses, 3 semester credit hours of research seminars, a minimum of 6 semester hours of electives, and a minimum of 6 semester credit hours of Master's Research.
- **Support Work:** In addition to courses and research in the field of specialization within ME, support work will be performed by students to broaden or supplement the student's preparation. Support work may consist of conference attendance, writing of

abstracts and manuscripts, and presentations at national conferences. Language Proficiency: Biomedical Engineering students are required to possess a competent command of English.

- **Transfer of Credits:** Students in the Joint M.S. Program in BME are expected to complete all coursework at UTSA and/or UT Health San Antonio. Exceptions require approval of the Graduate Program Committee, the Graduate Schools at corresponding institutions, and the administrative office responsible for graduate education.

- **Undergraduate Credit:** Credits earned in undergraduate-level courses are not applied towards the Joint M.S. Program in BME. At the recommendation of the Research Advisor, Graduate Program Committee, or Admissions Committee, such courses may be taken to enhance a student's ability to successfully complete graduate courses or to provide the necessary knowledge to initiate a student's research.

- **Not Accepted:** Courses completed by correspondence or extension may not be applied towards the Joint M.S. Program in BME.

- **Completing the Degree:** In addition to completing the course work with required core courses, seminars, and electives required by the program, a thesis, which is an original contribution to scholarship, based on independent investigation (graduate research) in the major area, is required. The M.S. thesis research will be conducted by the student under the guidance of the Supervising Professor and the advice of the M.S. Thesis Committee. The M.S. Thesis Committee will consist of at least four members, including the Supervising Professor. In addition to the Supervising Professor, two of the other members of the M.S. Thesis Committee must be a BME program faculty, with one from UTSA and the other from UT Health San Antonio. The other committee member has to be an outside member and should not be a BME program faculty. 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 M.S. Thesis Committee or uses UTSA or UT Health San Antonio 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 the UTSA or UT Health San Antonio. No more than 2 courses for which a grade of less than "C" can be earned while in the Joint M.S. Program in BME.

- **Registration during Examination Semester(s):** Students must be registered during any semester in which they are taking required examinations.

- **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 M.S. Thesis Committee. After the Thesis Committee makes a decision, which must be unanimous, to accept a thesis for examination, the student

notifies the Graduate School and the Program at least three weeks in advance of the date of the final oral examination. In addition, the posting of the examination at least 3 weeks prior to the day of the examination, the student is also required to provide his/her thesis to the committee members at least two weeks before the day of the examination. All thesis defenses consists of a seminar presentation by the candidate to the general public followed by a closed door examination. A closed door examination by the M.S. Thesis Committee will cover the general field of the thesis, and other parts of the student's program as determined by the respective committee.

Members of the M.S. Thesis Committee must be satisfied that the student has:

1. Completed the research approved by the M.S. Thesis Committee;
2. Passed all examinations required by Graduate Program Committee, including the successful defense of the thesis;
3. Completed the required coursework; and
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 M.S. Thesis Committee members will sign the approval forms for the M.S. Thesis and make an official recommendation to the Graduate School at UTSA or to the Graduate School of Biomedical Sciences at the UT Health San Antonio that the Master's degree be awarded.

Master's Degree Requirements and Program of Study Non-thesis Option

In addition to the thesis option, M.S. students in the Joint Graduate Program can complete their degree with a non-thesis option. All Students enrolled in the non-thesis option will require approval from the Program Director. Typically, a Master's degree (non-thesis Option) program of study will consist of at least 36 semester credit hours beyond the bachelor's degree. Course requirements for non-thesis students are 17 semester credit hours of required core courses, 3 semester credit hours of research seminars, a minimum of 15 semester hours of electives, and a 1 semester credit hour of Biomedical Project or Comprehensive Exam.

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 BME COGS. If recommended by the COGS, the request will then be submitted to the Dean of the Graduate School for approval.

The following have been adopted by the Program Director, Associate Program Director, BME program faculty, and staff in order to maintain the quality of the Joint M.S. Program in BME:

- Open-door policy of Program Director and Associate Program Director, faculty and staff to assist students with any issues relating to the Joint Graduate Program, University, and/or any other issues pertaining to the student while in the program;
- Program Director and Associate Program Director scheduled regular meetings with all students individually to review their progress;

- Faculty recruitment to obtain best qualified professors;
- Commitment of faculty to ensure student success;
- Commitment to recruit students of high caliber to the program;
- Continue to monitor, evaluate, add, and/or modify courses;
- Dissemination of appropriate information regarding courses, job opportunities, training, grants, or scholarship opportunities to students and faculty.

Comparison of curriculum to peer programs

The Joint Graduate Program in BME is able to attract qualified students from a diverse background. The Joint Graduate Program is also able to compete with other programs based on the resources that are offered to students, while also helping to better the community as a whole.

Admissions criteria

Ph.D. Admission Requirements and Deadlines

Transcripts: Official transcripts from all institutions attended. All international transcripts must be recorded in English or officially translated to English.

Graduate Studies Application: Yes

Department Application: No

Test Scores: General GRE Required

Mean Verbal Reasoning GRE of new entrants: 153

Mean Quantitative Reasoning GRE of new entrants: 160

Resume or CV: Yes

Letters of Recommendation: 3 L/R required attesting to the applicant's readiness for doctoral study

Statement of Purpose: Must include applicant's research experience, interests and goals

Minimum TOEFL Score (for International Applicants): 550 paper/79 internet

Minimum IELTS Score (for International Applicants): 6.5

Additional Requirements: International students and those with international degrees may be required to submit additional documents per our admissions policies and procedures. The Graduate School reserves the right to request any additional documents needed to fairly and consistently evaluate applicant credentials.

Full-Time or Part-Time Attendance Requirement: Full-Time

In addition, the committee will also take into consideration the student's research interest within the BME program to ensure that it matches with the current faculty research interest.

M.S. Admission Requirements and Prerequisites

Graduate Studies Application: Yes

Department Application: No

Transcripts: Official transcripts from all institutions attended. All international transcripts must be recorded in English or officially translated to English.

Test Scores: General GRE Required

Mean Verbal Reasoning GRE of new entrants: 147

Mean Quantitative Reasoning GRE of new entrants: 153

Resume: Yes

Letters of Recommendation: Three letters of recommendation are required attesting to the applicant's readiness for graduate study.

Statement of Purpose: Must include the applicant's research experience, interests, and goals.

Minimum TOEFL Score (for International Applicants): 550 paper/79 internet

Minimum IELTS Score (for International Applicants): 6.5

Additional Requirements: International students and those with international degrees may be required to submit additional documents per our admissions policies and procedures. The Graduate School reserves the right to request any additional documents needed to fairly and consistently evaluate applicant credentials.

Students and Graduates

Highly qualified students have been attracted to the Joint Graduate Program from its inception. Applications have been received from all over the United States, India, China, South Korea, Venezuela, Iran, Mexico, and Italy. Students accepted into the Joint Graduate Program have come from many of the colleges and universities in San Antonio (UTSA, UT Health San Antonio, St. Mary's University, Trinity University, etc.), as well as in Texas (UT-Austin, Texas A & M, Southern Methodist University, Rice, etc.), and neighboring states (Arizona State University, Tulane University, Louisiana Tech, etc.). More distant from San Antonio, students have been accepted from MIT, Georgia Tech, Tufts University, North Carolina State University, Purdue University, and Florida Atlantic University as well as Zhejiang University and Zhongshan University in China and Indian Institute of Technology.

Admission into the Joint Graduate Program is selective with only about 45-50% of the applicants being offered admission. Enrollment has been a subset of those offered admission and has ranged from 40-80%. The average GRE scores of all students matriculating into the Program are Verbal 150 and Quantitative 156.5. The average GPA for the same cohort of students was 3.46 on a 4.0 scale. The racial, ethnic, and gender diversity of the students is also one of the strengths of the Joint Graduate Program and continues the historic role of both UTSA and UT Health San Antonio as minority-serving institutions within the state of Texas.

Recruitment to the Joint Graduate Program comes from the joint BME program website; faculty sponsors local outreach opportunities, national/international conferences, and student organizations. For example, there are student organizations such as the Biomedical Engineering Society which focus their activities at the national conferences, but recently has begun to target high school students and the younger population. Their impact has yet to be determined, but appears promising for future enrollment in the Joint Graduate Program.

Faculty

There are core and associated faculty affiliated with the Joint Graduate Program, with primary appointment either at UTSA and UT Health San Antonio. These faculty members hold academic ranks (Instructor through Professor) at their respective institution. Program faculty at UTSA were drawn from both the College of Engineering (Departments of Biomedical Engineering, Electrical Engineering, and Mechanical Engineering) and the College of Sciences (Departments of Biology, Physics, and Chemistry). Similarly, program faculty at UT Health San Antonio were drawn from the Medical School (Departments of Biochemistry, Molecular Medicine, Physiology, Radiological Sciences, Medicine/Cardiology, Orthopedics, Rehabilitative Medicine and Research Imaging Center) and the Dental School (Departments of Community Dentistry, Periodontics, and Comprehensive Dentistry). In addition, program faculty members are also drawn from local companies and research institutes involved in bioscience research. The Joint Graduate Program has a number of outstanding faculty, several of whom are leaders in their respective fields and internationally recognized. The Joint Program's core faculty is almost equally divided between UTSA and UT Health San Antonio.

Faculty qualifications

The faculty qualifications to be involved with the Joint Graduate Program are:

- A Ph.D., M.D. or an equivalent degree
- Postdoctoral training
- Research (publishing and grant) experience and teaching (undergraduate or graduate level teaching) experience

Guidelines for Appointment to the Faculty: Faculty desiring a formal relationship with the BME Program will be appointed as either Core or Associated Faculty. The criteria to be used in determining the appointment are delineated below.

Guidelines for Appointment to the Core Faculty: An appointment to the core faculty entitles the faculty member to serve as a mentor for a BME Ph.D. student and chair his/her dissertation committee, but also carries with it the responsibility to actively participate in the ongoing activities of the program. This would include, but is not limited to, course/curriculum development and didactic activities (including teaching courses requested by the Joint Graduate Program), participation in preparing, administering, and grading of Qualifying Exams, and assisting with the administration of program activities such as recruitment, admissions, serving on the COGS or as Graduate Advisor.

Criteria that will be considered for appointment to the core faculty will include evidence of an ongoing and active interest in some area of bioengineering or biomedical engineering for the last three years. Each request for appointment will be considered on its own merit, but the faculty member's performance related to biomedical engineering will be of major importance. This will include past and current grant funding, publications, commitment to teaching activities and course development in biomedical engineering, membership in biomedical engineering-related professional societies, and prior successful mentorship of graduate students in other programs. Faculty will be encouraged to supplement their request with any information they believe is relevant and which supports their application for appointment to the core faculty.

The COGS is responsible for reviewing each application and then forwarding a recommendation to the Program Director and Graduate Deans at UTSA and UT Health San Antonio for approval. The COGS will review applications two times per year, in June and December. Upon appointment to the program faculty, a separate application for appointment to the Graduate Faculty, if not currently a member, must be submitted to the appropriate Dean's office.

The COGS will also review the performance of existing core and associated faculty every three years based on the criteria above and then recommend appropriate reappointment action.

Guidelines for Appointment to the Associated Faculty: An appointment to the associated faculty entitles the faculty member to serve as a dissertation committee member for a BME Ph.D. student, but not chair the dissertation committee. The faculty member must also participate in some other aspect of the program, such as occasional lectures in BME courses or instruction in various procedures or use of specialized equipment.

Criteria that will be considered for appointment to the associated faculty will include evidence of an emerging or developing interest in some area of bioengineering or biomedical engineering. Each request for appointment will be considered on its own merit, but the faculty member's past and current grant funding, newly submitted grants that include work in biomedical engineering, abstracts and publications of work in the developing area, giving lectures in courses taken by BME students, membership in biomedical engineering-related professional societies, and prior successful mentorship of graduate students in other programs will be considered.

Faculty will be encouraged to supplement their request with any information they believe is relevant and which supports their application for appointment to the associated faculty.

The COGS is responsible for reviewing each application and then forwarding a recommendation to the Program Director and Graduate Deans at UTSA and UT Health San Antonio for approval. The COGS will review applications two times per year, in June and December. Upon appointment to the program faculty, a separate application for appointment to the Graduate Faculty, if not currently a member, must be submitted to the appropriate Dean's office.

The COGS will also review the performance of existing core and associated faculty every three years based on the criteria above and then recommend appropriate reappointment action.

Resources

Facilities and equipment

The UTSA and the UT Health San Antonio offer many resource facilities with biotechnology equipment and state-of-the-art laboratories. The Biotechnology, Sciences and Engineering (BSE) building is a 220,000-square foot facility that won the Education Design Showcase 2006 award.

The newest building on the 1604 campus is the Applied Engineering and Technology (AET) building. Administrative offices are located in the AET Building in Room 1.102. The building was completed in October 2009. This latest addition to our 1604 campus is comprised of laboratories and classrooms for College of Engineering students. It is 150,000 square feet and sits alongside the BSE building.

Many BME faculty labs are housed at South Texas Research Facility (STRF) at UT Health San Antonio. The UT Health Science Center has made major investments in advanced research technologies in order to propel innovative medical research. The core services will be continually updated as technologies evolve to serve the needs of all researchers, including senior faculty members whose own research is closely aligned with new technologies being made available in the facility.

STRF Core Facilities:

Core for Advanced Translational Technologies (CATT): The UT Health San Antonio Core for Advanced Translational Technologies is UT Health San Antonio Core Laboratory. The advancement of scientific discovery in translational sciences can be accelerated by the application of cutting-edge technologies. To this end, the CATT has created an integrated system of high-throughput, high-content research services with automated specimen processing emphasizing precision, accuracy, and quality control.

Flow Cytometry: The Cancer Center Flow Cytometry Shared Resource has been integrated in the institutional Flow Cytometry Facility (FCF) and has been in existence for 26 years. It located

in room 5.044V on the Long (main) campus.

Major equipment:

11-color LSR-II

13-color FACSAria-IIIu.

14-color MoFlo Astrios arrives

4-color FACSCalibur

3 dedicated computers for data analysis

The Flow Cytometry Core is a biohazard safety level 2 (BSL-2) facility, so the core can sort all NIH/CDC designated biohazard 2 agents which include primary human cells and cell lines, transfected cell lines, and live cells containing known level-2 pathogens. All core personnel are trained and certified in proper BSL-2 safety procedures.

The Flow Cytometry Core is operated and managed by three experienced persons. Collectively, they have more than 33 years of flow cytometry experience in addition to 10 years of sorting experience.

Optical Imaging: High-end instrumentation for acquisition and analysis of optical data is expensive and requires continued maintenance and improvements. The necessary commitment to this technology is often difficult to maintain within individual laboratories, especially when optical imaging is not a major focus for the laboratory. Therefore, the Core Optical Imaging Facility fills a critical need of UT Health San Antonio investigators and neighboring scientific community by offering,

- access to state-of-the-art technology for imaging of living cells, tissues, and animals.
- consultation, education and assistance regarding the theory and application of optical imaging techniques.
- technical advice on specimen preparation techniques and probe selection.

Facilities Run by BME Faculty:

Research Imaging Center

Scanning Electron Microscope (SEM)

UTSA-Micro Computerized Tomography (MicroCT)

UT Health San Antonio-Micro Computerized Tomography (MicroCT)

Nanobiomaterials & Tissue Engineering Lab

Advanced Implant and Materials Systems

Cellular & Tissue Engineering

Functional Hybrid Biomaterials

Nano Biomaterials & Tissue Engineering

Vascular Bioengineering

Nanosensor and Nanomedicine Research

Advanced Biophotonics and Nanotechnology

Vascular Biomechanics and Biofluids

Ocular Biomechanics

Regenerative Materials Engineering and Device

Additional Facilities at UT Health San Antonio Accessible to Faculty & Students: The following research Centers at UT Health San Antonio are affiliated with the Joint Graduate Program and work closely in training students:

Research Core Laboratories: The institutional Research Core Laboratories are beginning the transition to the iLab Core Facility Software. This is a new online system to streamline the process of ordering and billing for core service requests. The implementation will take place in stages, so please visit the first three cores to go live with iLabs:

Biobanking and Genome Analysis (Genomics)

Core for Advanced Translational Technologies (CATT)

Mass Spectrometry Laboratory

Our dually-enrolled students have access to the John Peace Library at UTSA and the library at UT Health San Antonio. Additionally, our students have access via the Inter-Library services, including the libraries of the University of Texas system and St. Mary's University in San Antonio. The service is available free of charge to the Biomedical Engineering students and faculty.

Additional Core Facilities at UTSA Accessible to Faculty & Students:

- *Advanced Visualization Lab (AVL):* Established and maintained by UTSA's College of Engineering, the AVL allows researchers from all disciplines of art, science, and engineering to conduct simulation and visualization research. The AVL aids in understanding complex phenomena and translating data into images on a large scale using high resolution visualization walls and other display devices.

RCMI Advanced Imaging Core (AIC) Facility: The AIC, supported by the NIH/NCRR RCMI program, is located in the Biotechnology, Sciences and Engineering Building and features a 2000 sf four-room suite of cutting edge imaging technology, which places UTSA among top tier institutions in the area of microscopy. The facility utilizes cutting-edge imaging technologies that enable UTSA researchers to investigate and analyze biological processes in live cells at the molecular level with exceptional sensitivity and precision. This technology supports basic and translational research, including applications to develop therapeutic interventions and vaccine development. It is managed full time by Dr. Colleen Witt, an immunologist with expertise in confocal and two photon imaging and fluorescence-based imaging analysis.

RCMI Computational Biology Initiative (CBI) Core Facility: Launched in 2005 with support from the NIH/NCRR RCMI program, the CBI contains high performance computing infrastructure for modeling and simulation of biological systems, live cell imaging, and protein biomarker research. This infrastructure enables the integration and processing of the enormous amount of data generated in studying complex biological interactions and, as such, it is a key component for advancing basic and translational health research at UTSA. The overall goal of the initiative is to build infrastructure to significantly advance collaborative interdisciplinary bioscience research in San Antonio, enhance local expertise in the bioscience community, and to develop training opportunities. The facility provides centralized computational support and expertise for both UTSA faculty and students.

RCMI Nanotechnology and Human Health Core Facility: Supported by the NIH/NCRR RCMI program, this facility focuses on the synthesis and characterization of nanomaterials for imaging, labels for bioassays, and active targeting for in vivo or in vitro diagnostics. The Core studies the interaction of nanoparticles with living cells for application in the targeted delivery of drugs, genes, and proteins; tissue engineering scaffolds; artificial organs and implants; and bioimaging and cell labeling. Additionally, the Core supports development of new advanced characterization methods to study biological tissue using nanoparticles and advanced electron microscopy techniques to produce three-dimensional structural information for imaging cell membranes, organelles, and other subcellular structures.

RCMI Proteomics and Protein Biomarkers Core Facility: Located in the Biotechnology, Sciences and Engineering Building and supported by the NIH/NCRR RCMI program, the Proteomics and Protein Biomarkers Core Facility has the equipment and expertise necessary to assist researchers to identify, quantify, and sequence large numbers of proteins in complex mixtures, as well as assess the position of posttranslational modifications. It contains infrastructure and instrumentation necessary to identify and characterize highly sensitive and specific protein biomarkers, including biomarkers that are particular to minority populations. These biomarkers can be used clinically to screen for and diagnose diseases and to guide and assess molecularly targeted therapy.

Stem Cell Core Lab: All stem cell culture research is conducted in the newly furnished Stem Cell Core lab, a dedicated cell culture suite that includes a 120 sq. ft. antechamber and two 110 sq. ft. culture rooms with HEPA filtered positive pressure airflow. The core lab is housed in the Biosciences Building and each lab has exclusive use of one of the 110 sq. ft. culture rooms.

X-ray Crystallography Lab: This facility offers X-ray diffraction analysis for small molecules, the most reliable process for ascertaining the structure of crystalline materials. The facility maintains a Rigaku diffractometer, a sealed tube system that is equipped with a CCD area detector that can analyze samples at various temperatures. The X-ray Crystallography Lab also specializes in growing suitable single crystals for submitted samples and has access to the electronic Cambridge Structural Database.

Kleberg Advanced Microscopy Laboratory: The Kleberg Advanced Microscopy Laboratory was specially designed to house the JEOL second-generation aberration-corrected electron microscope - one of only two worldwide. With a resolution of 0.8 nm, it is propelling world-class research in nanotechnology, biology, chemistry, geology, engineering, and medicine. UTSA will use the microscope to develop new materials and for many other applications. The microscope will be accessible to researchers worldwide, operating every day around the clock. The laboratory also houses a scanning electron microscope (SEM), a transmission electron microscope (TEM), and two scanning probe microscopy and atomic force microscopy (SPM–AFM) systems.

Micro-Electro-Mechanical Systems (MEMS) Research Laboratory: Established in 2004, this 5000 sf facility is used to train students for careers in micro and nanotechnology. Areas of research include the utilization of MEMS actuators onphase array antennas, nanotechnology, CMOS-compatible microwave varactors, negative index of refraction materials for imaging and other photonic applications, sensor arrays, micro-chemical reactors, and micropropulsion employing solid fuels.

Financial resources

A number of mechanisms are used to financially support graduate students in the Program. All first year Ph.D. students are supported by program funds. After their first year, students are expected to have located a mentor who can support the remainder of their graduate studies. This support includes a number possible mechanisms such as NIH and NSF assistantships or training grants, fellowships provided through the Sloan Foundation, industry-sponsored projects, and other sources of discretionary funding available to the supervising professor.

Financial Aid Information

Master's Program

Competitive Scholarship is available for qualified M.S. students in the degree-seeking Biomedical Engineering Program. State law requires that each student identify any relation to a current member of the University of Texas System Board of Regents. A student who is related to a current member of the University of Texas System Board of Regents is prohibited from receiving scholarships unless the scholarship is awarded exclusively based on academic merit or is an athletic scholarship.

Ph.D. Program

All doctoral applicants applying for full-time status will automatically be considered for a stipend per year plus full-tuition and fees and health insurance. Supplemental stipends (\$1,000 to \$5,000) for outstanding students are also available. Scholarships (stipends + tuition + fees+ insurance) offered to our current students range from \$26,000 to \$35,000 per year.

Valero Scholarships

Valero offers scholarships for both full-time M.S. and Ph.D. students. Students are encouraged to apply via the UTSA College of Engineering department website.

Other Financial Assistance

Teaching and research assistantships may also be available from research mentors. There are also financial aid opportunities such as the Beldon Scholarship, Mcnair & others.

Student Housing

At UTSA students have a choice of on-campus housing options. The newest on-campus residences are Laurel Village and Chaparral Village. These two complexes offer apartment-style living with a choice of either two or four private bedrooms in an apartment with a living room and a kitchenette with a microwave, sink and full-size refrigerator (no stove/oven). These complexes are owned and managed by UTSA and residents are required to purchase meal plans.

BME Graduate Program: Admissions

1. Application Method

- a. The Biomedical Engineering (BME) MS/PhD program is for students with a bachelor's or advanced degree (MS, PhD, MD, or DDS) who want to obtain a MS/PhD degree in Biomedical Engineering.
- b. Students will apply to the BME MS/PhD program through a central application process through UTSA. All applications and associated data are forwarded and entered into PeopleSoft and/or IMPACT database(s) at UT Health San Antonio. All applications must be reviewed by the Admissions Committee, which makes recommendations to the Program Director and Associate Program Director. All admissions (MS/PhD programs) must be approved by the Program Director, Associate Program Director, Dean of the Graduate School at UT Health San Antonio, and the Dean of the College of Engineering at UTSA for MS students or the Dean of the Graduate School at UTSA for PhD students, respectively. UTSA will share all accepted applications with UT Health San Antonio for matriculation by July 1 for the fall semester, December 1 for the spring semester, and May 1st for summer semester. Acceptance letters must have both university logos/names and the signatures of the respective Deans from both institutions.

2. Adherence to Admission Requirements

- a. Since application to the BME program is centralized and is managed by UTSA, all applicants are required to follow UTSA's admission requirements. In the event whereby applicants are taking courses and/or are mentored by faculty at UT Health San Antonio, they are required to abide by UT Health San Antonio's requirements (background checks, GRE scores, immunizations and international transcript review/translation/certification).
- b. Sharing of information will be accomplished via certified paper copies of pertinent documents and transcripts prepared and delivered/transmitted by the Home or Partner institution one to another as the case may be. For admissions purposes only, including exchange of applications, said activity is allowed as the Federal Education

Rights and Privacy Act (FERPA) applies specifically to student records. Students will be informed about the need to share and exchange education records in the Admission guidelines for the BME program.

3. Leave of Absence

All students are not permitted to be absent from the program without applying for a Leave of Absence. Leave of Absence will not be permitted for more than two consecutive semesters and all statuses must be shared with the Partner Institution. Leave of Absence requires approval from both the director and/or associate director and must adhere to the policy of the student's home institution. This includes approval from the Graduate Dean of the student's Home Institution.

4. Re-Admission

Former admitted students seeking re-admission after a break in enrollment of more than two consecutive semesters must re-apply under the same requirements, procedures, and considerations that applied to the initial application for credit or non-credit admission. Reapplication is not required if the absence is approved.

5. Student Orientation

A joint student orientation will be offered each semester, alternating between UTSA in the spring semesters, and UT Health San Antonio in the fall semesters. Each orientation will provide general and graduate school specific information, as well as information on mentorship, peer advising, course selection as appropriate and relevant to the student's needs and respective BME program emphasis. BME program orientation will be provided by the Program Directors and Graduate Advisor of Record and will emphasize academic advising. BME students will also attend any institution-specific orientation for both UTSA and UT Health San Antonio.

BME Graduate Program: Matriculation Procedure

1. Mentors and Home Institutions

UTSA is considered a student's "Home Institution" for students entering the Biomedical Engineering MS or PhD programs unless a student enters the PhD program with a supervising professor at UT Health San Antonio. Once a student (MS with thesis or PhD) selects a supervising professor with a primary appointment at UT Health San Antonio, UT Health San Antonio becomes the student's Home Institution. Students may have only one supervising professor. If a co-supervising professor exists, only the primary supervising professor should be listed officially. The Home Institution is the only degree-granting institution for official reporting purposes. Both universities will be the primary custodial institution of record from admission to graduation for that student and hence, all student records must be updated and shared at no cost during the admissions process. The Home Institution cannot be

changed solely at a student's request. This would change only in the event that a new supervising professor is assigned and the supervising professor resides at the Partner Institution, although these changes are neither expected nor encouraged. Changes will only be approved for exceptional or necessary circumstances, e.g. change in mentor, with agreement by the affected Partner Institution. Degree certification and audits will be performed by the Home Institution. Students may only attend the graduation ceremony of the designated home institution.

2. Interruption/Changed Matriculation

- a. **Add Class(es)** - Students may add a class(es), subject to individual program guidelines, and the deadline set by the affected Partner Institution, but not after the official census date noted by said institution for that class.
- b. **Drop Class(es)** - Students may drop a class(es), subject to the deadline or conditions of the affected Partner Institution in consultation with the Home Institution. Students must bear in mind any impacts these drops have on their financial aid and/or visa status. The institution at which the student withdraws must be notified immediately and no later than one business day following the dean's approval to withdraw.
- c. **Program Withdrawal** - Students may withdraw from the program based on consultation with their Home Institution. The timing of said withdrawal will determine whether a student will receive a refund and how much.
- d. **Leave of Absence** - Students may request a Leave of Absence up to a maximum period of one year, from the Home Institution. Authorization and approval of such a leave is granted by the appropriate Graduate Dean of the student's Home Institution, in consultation with the BME COGS as appropriate. Leave of absence requires approval from both the director and/or associate director and must adhere to the policy of the student's home institution. A copy of the letter will be provided to the Graduate Dean of the Partner Institution.
- e. **Change of Major or Program Emphasis** - Students may request a change only between semesters or prior to the census date of the new semester. All such changes must be accomplished at the Home Institution with approval of the appropriate Graduate Dean, consultation of the BME COGS and completion of requisite documentation and subsequent submission of the information to the Graduate Dean of the Partner Institution.
- f. **Partner Notification** - In all situations where there is a change in the student's program due to any of the above situations, the institution at which the change is initiated is responsible for notifying the Partner Institutions. Notification will occur within ten business days of approval of said action.

IMPORTANT NOTE: All students who are currently here on a non-immigrant visa must consult both the Office of International Services at UT Health San Antonio and/or the Office of International Programs at UTSA before making any changes in their enrollment status. It is imperative to comply with policies and procedures from the international offices.

3. **Additional Interruption/Changed Matriculation Clarification**

a. **Drop Class(es)** - Students may drop a class in which a passing grade is currently being earned. Students may not drop a class for which they are on academic probation. This is to preclude withdrawal to avoid receiving an “F” grade.

b. **Withdrawal** - Students who successfully withdraw from a class before the first class grade posting will receive a “W” for that class. Thereafter, subject to the guidelines of the affected Partner institution, withdrawal may be precluded or an assignment of a “WP” (Withdraw Pass) or a “WF” (Withdraw Fail) may be assigned.

4. **Interruption Caveats**

Student Status - Any student who is **receiving financial aid, has a visa status other than permanent resident, or is receiving military educational benefits** must contact and receive written clearance from the applicable **Financial Aid Office, Veteran Services Office, or International Services Office** before the requested “interruption” is approved by the BME COGS and subsequently by the appropriate Graduate Dean of the student’s Home Institution.

5. **Grading System/Academic progress**

Each Partner Institution measures academic achievement via an alphabetical, pass/fail or satisfactory/unsatisfactory designation as determined by the Partner Institution’s Graduate School. Regardless of the system used, students must maintain a “B” or equivalent average at all times. For Partner Institutions that use an alphabetical system, a numeric grade on a 4.0 scale, a “B” average, an 80 or above score, or 3.0 GPA, that same system must be maintained for all coursework in that system. Regardless of the system, failure in a core class in any measurement system requires a successful one-time repeat of the failed class or an equivalent class in that domain. Failure in an elective class allows a successful one time repeat of that failed class or another class of equal credit hours so long as curriculum guidelines within the individualized degree plan are met. The procedure to address a student’s failure in more than one core class will be determined by both institutions and BME COGS if appropriate.

6. **Program Completion/Graduation Time Limit**

The target time of completion should be five (5) years for a Ph.D. degree and two (2) years for a M.S. degree. Any student whose time to completion exceeds those standards must meet with his/her mentor and Associate Dean as appropriate to ensure that 1) coursework or major examinations taken more than five (5) years prior to the end of the candidate’s final semester have not been rendered obsolete in light of changes and

program content and industry knowledge, and 2) that the learning outcomes achieved prior are reflective of those in place at the time of program completion. In scenarios where the mentor and/or program and school administrators determine that program content, industry knowledge or learning outcomes have evolved, those individuals will collaborate on a plan for repetition of course work and/or examinations. Said plan must specifically be approved by the BME COGS.

7. **Graduation Criteria**

The Ph.D. degree is awarded upon satisfactory completion of a minimum of 82 semester credit hours and satisfactorily completed all the requirements for the dissertation. The M.S. degree is awarded to students either a) upon satisfactory completion of a minimum of 32 semester credit hours and satisfactorily completed all the requirements for the thesis, or b) successful completion of a minimum of 36 semester credit hours of the required course work and a comprehensive exam. Each student will apply to and be approved for the degree and graduation by the student's Home Institution. Degrees awarded are joint degrees with the other Partner Institution and awarded on the official graduation date indicated to the University of Texas System and published by the Home Institution. The diploma will be issued in the name of the Home Institution and Partner Institution. Students wishing to participate in their graduation ceremony are to only attend the graduation ceremony of their Home Institution. Graduation fees, as appropriate, will be assessed by the Home Institution.

8. **Program Coursework Publication (Paper and/or Online)**

Full BME program coursework including detailed Plans of Study will be published in the official catalog of each Partner Institution. Site location of coursework will be identified if a course is provided at a Partner Institution and not the location of the catalogue issuer. All coursework, wherever taken, will be officially recorded. This procedure will allow for accurate transcript recording of grades by all Partner Institutions regardless of the physical site of the completed class. All Partner Institutions will facilitate regulatory compliance and share applicable communications and documentation.

BME Graduate Program: Registration Procedure

1. Admitted students may be eligible for transfer credits. To qualify, an admitted student must submit official college level transcripts from all attended colleges/universities to the Home Institution and request an evaluation for such prior to the deadline for admission of transfer students. Credit must have been earned from a previous institution with an earned grade of "B," or its equivalent, in other grading systems. Both institutions must approve transfer credits. Each institution's respective approval process for awarding of transfer credit must be followed completely for students to earn the transfer credit sought.

2. Admitted students must register for BME MS/PhD program classes by the deadline(s) of each Institution, or prior to the beginning of the first day of classes for the term, at the discretion of the Institution.
3. A student is eligible to register if he/she is in good standing in both institutions. Good standing will be defined by the published and/or practice of the Partner Institution in which the student is enrolled and can include the following: GPA of 3.0 or better, having no unpaid institution debts, and/or having no institution holds or any other restrictions that would not allow registration. If such definition is not as stringent as that of the Home Institution, the definition of the Home Institution will apply.
4. A student must remain active at his/her Home Institution if he/she is also seeking registration at the Partner Institution. For any semester where the student is not taking at least one semester credit hour at UTSA, the student will still be considered “active” and must be enrolled via a zero credit hour “placeholder” course. UT Health San Antonio will not require placeholders and will simply keep the students active in a term without enrollment. In each semester, the student’s Home Institution should maintain a record of the total semester credit hours being taken for that term regardless of class location, as a method of enrollment tracking, especially for those students who must maintain full time status. For tracking purposes, “placeholder” registration, or whatever procedure is used, should not activate any coursework-specific tuition/fees. However, the Partner Institution may, based on respective policies, have the option to assess certain extraneous fees (parking, ID badge, recreation, etc.) attributable to that institution’s management or maintenance of certain services provided for all enrolled students. In addition, a student must also be registered at a specific Partner Institution if that student is using that Partner Institution’s resources of any kind such as attending classes, taking examinations, conducting dissertation or thesis research, defending a doctoral dissertation or M.S. thesis, graduating, etc. Students enrolled in research courses must at least be registered at their Home Institution in all semesters during the research process.
 - a. Master’s with thesis: Any master’s student conducting research with a supervising professor at UT Health San Antonio must enroll for a minimum 6 SCH total, and at least 1 SCH per semester, of BIME 6097 Research. Students must also enroll for one semester of BIME 6098 Thesis (See UT Health San Antonio Catalog for details on specific requirements on enrollment criteria). Students conducting research with a supervising professor at UTSA must be enrolled in a minimum of 6 SCH total of BME 6981, 2, 3, or 6.
 - b. **PhD:** Any PhD student conducting research with a supervising professor at UT Health San Antonio must enroll for a minimum of 15 SCH total, and at least 1 SCH per semester of BIME 6097 Research. Students must also enroll for at least two semesters of BIME 7099 Dissertation (See UT Health San Antonio Catalog for details on specific requirements on enrollment criteria). PhD students conducting research with a supervising professor at UTSA must enroll for at least a minimum of 16 SCH total of Doctoral Research (BME 7951, 2, 3, 6) and a minimum of 6 SCH of Doctoral Dissertation (BME 7991, 2, 3, or 6 over) two semesters.

BME Graduate Program: Financial Aid and Veteran Benefits Procedure

1. As indicated in the Admission Policy, all admitted students must have a derived Home Institution, including without limitation any student receiving financial aid through the US Department of Education, the Department of Defense and/or any other government entity or private resource as may be identified by any Partner Institution. In addition, it is strongly recommended that any such student not change their Home Institution designation over the course of their academic career unless the student changes mentors or the student's mentor changes his/her primary appointment, and the change is supported by the BME COGS.
2. Each student will have an academic curriculum (Plan of Study) established in consultation with faculty advisors and shared with the Partner Institution by the Home Institution before matriculation begins.
3. Students receiving any form of financial aid that may not be automatically or fully distributed by the Home Institution to cover the payment of all tuition and fees to a Partner Institution, will be personally responsible for the payment of tuition and applicable fees to such Partner Institution from aid.
4. The Home Institution will be responsible for the following regardless of whether the student is taking any classes at the Home Institution in that term:
 - a. Determine if a Consortium Agreement is required. If yes, initiate, maintain and complete the agreement process;
 - b. Award and disburse all eligible aid to the student;
 - c. Report enrollment to the National Student Clearinghouse or National Student Loan Data System (NSLDS);
 - d. Track and return Title IV funds as applicable;
 - e. Provide financial literacy training as appropriate.
5. The Partner Institution will be responsible for the following if, and only if, a student in the BME program is taking any courses at the Partner Institution for any given term.
 - a. Complete their portion of the Consortium Agreement;
 - b. Report any enrollment changes to the Home Institution during the term.

IMPORTANT NOTE: International students are not eligible to receive state or federal financial aid.

BME Graduate Program: Tuition and Fees Procedure

1. **In-state vs. Out-of-State Tuition:** Generally, rates for in-state (resident) and out-of-state (non-resident) student tuition and applicable fees are determined by each Partner Institution pursuant to each Partner Institution's tuition and fees policy and are subject to adjustment by each Partner Institution. However, the criteria for determining student domicile residency are the same for each Partner Institution.

2. **Residency:** Tuition and fees will be based on the student's domicile residency status for the purpose of assessing tuition and fees. This status will be determined by UTSA as all students will first apply to UTSA. This residency is to be distinguished from the residency determination involving non-immigrant visa status. Initial charges for tuition and fees will be calculated by the student's Home Institution using the applicable Texas Education Code, the THECB rules, UTS regulations, and applicable HOP procedures for that Home Institution. As a general rule, assessments will be calculated by the Partner Institution. Once residency is correctly established, the residency designation will be the same for the student's enrollment at the other Partner Institution. Students who do not qualify for in-state tuition, may seek tuition waivers. Institutional requirements must be met for waivers.
3. **Tuition:** Students will be billed *tuition and applicable fees* by the Home and Partner institution in which they are enrolled in accordance with the Partner Institution's published tuition and fee schedule. Each student will be responsible for **payment of tuition and fees** to each Partner Institution in which the student is enrolled. Tuition will be based on semester credit hours of enrollment at the respective Partner Institution. Students who receive financial aid, veteran benefits, or other supportive funding through their Home Institution, will be effectively advised and reminded by such institutions of their payment responsibility to all Partner institutions in which they are enrolled. BME students who receive a competitive scholarship/stipend are required to enroll full-time. These students are eligible for the Non-Resident Tuition waivers at each institution. It is UTSA's responsibility to send UT Health San Antonio Veteran Services and Financial Aid Office verification of the student's receipt of a competitive stipend in order for a waiver to be applied at UT Health San Antonio.
4. **Compulsory Student Service Fees:** Payment of compulsory student services fees shall be governed by Section 54.503(g) of the Texas Education Code, which specifies that compulsory student services fees will be paid to the Home Institution but *may be waived* by the governing board of the Partner Institution. Application and guidelines for providing such waivers will be determined by each Partner Institution and communicated to that Partner Institution's business office prior to the registration deadline for the BME program in their institution.
5. Students will follow each Partner Institution's policies and procedures in regard to payment schedule dates, refund dates, late fees, non-payment designation, etc. for each Partner Institution in which the student is registered.
6. Once tuition and fees are established by a Partner Institution, they are not subject to challenge.

- 1. Definition of International Student and Visa Sponsorship.** International students shall be defined as applicants for the program who are non-U.S. citizens or permanent residents and require sponsorship for an F-1 (or J-1 in limited circumstances) student non-immigrant visa to legally enter or remain in the United States. Such students shall be eligible for admission to the BME program subject to the same admission and registration criteria applied to domestic students. Any international student accepted into the BME program will generally be required to have an F-1 student visa, which mandates full-time enrollment for all academic terms required by the program for each year. Some applicants may be eligible for initial or continued sponsorship for a J-1 visa under the specific eligibility requirements set out by federal regulations.
- 2. Eligibility for and Maintenance of F-1 Nonimmigrant Status.** To be eligible for an F-1 visa, an international student must have and must maintain a home institution affiliation for the entire duration of his/her time in the BME program. Since all applications will initially be processed by UTSA, UTSA will be the Home Institution for all new incoming international students except for those who have supervising professors at UT Health San Antonio. The Home Institution will issue a Form I-20, which allows the student to apply for and maintain F-1 status. The Home Institution will adhere to and inform the student of all requirements per federal regulations for issuance of the Form I-20, including the submission of documentation from the student of financial resources to cover the costs of attendance for at minimum one academic year. The Home Institution shall be responsible for the maintenance of all Student Exchange Visitor Information System (SEVIS) reporting subject to Home Institution rules and requirements. As part of SEVIS compliance, all F-1 students must also maintain full-time enrollment as defined by the Home Institution during all terms required by the program. Per federal regulations, enrollment in a full course of study is as certified by the SEVIS Designated School Official (DSO). The DSO of the Home Institution will rely on institutional policy to advise the international student of the number of credit hours required for full-time enrollment in alignment with the official program requirements and the rules of the Home Institution's Office of the Registrar.
- 3. Admission of International Students.** The admission of international students shall initiate with the graduate school of each Partner Institution in close collaboration with the international office. All enrollments, from both Partner Institutions, must be verified each term by the DSO at the Home Institution prior to the Home Institution's census date.
- 4. Change of Home Institution.** An international student's Home Institution is initially designated as UTSA except for those who have supervising professors at UT Health San Antonio. Once the student declares a mentor/lab affiliation and if that mentor/lab is at the Partner Institution, the student must request to transfer Home Institution affiliation. However, transfer to the Partner Institution for F-1 visa sponsorship may only occur

prior to or at the beginning of a new term with the approval of both DSO's at the Partner institutions. For the transfer to be completed, the following must occur prior to the census date at the new Home Institution: The international student 1) must be admitted, 2) registered for courses at the new Home Institution, and 3) have paid tuition and fees to (or have a formal, documented payment arrangement on record with) the new Home Institution. The Partner Institutions' DSO's will coordinate the F-1 transfer process to ensure full compliance.

5. **Concurrent Enrollment.** The international student may concurrently enroll at both Partner institutions. They may be on site or online, but limited to no more than two Partner institutions, including the Home Institution, at the same time. Such concurrent enrollment must be equivalent to full-time enrollment as certified by the DSO at the Home Institution. The international student must be enrolled in at least one credit hour at the Home Institution at all times. The student is responsible for informing and providing documentation, such as proof of registration, of the concurrent enrollment to both institutions. Any subsequent changes to the approved concurrent enrollment status must be approved, in advance, by the DSO's of both Partner institutions. The Home Institution cannot be changed mid-semester/term. The international student must maintain full-time enrollment status or she/he will be in violation of his/her nonimmigrant visa status unless the DSO authorizes a reduced course load in advance pursuant to federal regulations.
6. **On-Campus Employment.** An international student in F-1 nonimmigrant status may engage in on-campus employment at the Home Institution for which s/he receives a stipend pursuant to the terms of a scholarship, fellowship, or assistantship. This stipend may be provided for on-campus work, not to exceed a total of 20 hours per week while school is in session and full-time when school is not in session (i.e. vacations). If the student is to perform work at the Partner Institution (i.e. not the Home Institution), then the work must be clearly related to and an integral part of the BME academic program. The international student must consult with his/her Home Institution's DSO before arranging for and accepting work at the Partner Institution. In all cases, the international student must maintain full-time enrollment status as defined by the Home Institution in order to be eligible for on-campus employment at either institution.
7. **Off-Campus Employment.** The international student may not under any circumstances engage in employment at a work location other than either Partner Institution without the specific authorization from the DSO at the Home Institution as required by federal regulations.

1. One of the goals of the BME program is to promote collaboration among faculty, students, and staff which will generate new intellectual property to help mankind. The collaborations are multi-disciplinary and multi-institutional.
2. UTSA policies for IP and revenue sharing shall apply to BME program graduate students (“BME student(s)”) who are mentored by UTSA faculty at the time of invention. These policies are described in the UTSA Handbook of Operating Procedures (Chapter 2.27, Intellectual Property) and the UTSA Guide to Invention, Innovation, and Commercialization (2009). Questions regarding IP can be directed to the UTSA Office of Commercialization and Innovation (210-458-6963).
3. UT Health San Antonio policies for IP and revenue sharing apply to BME Students who are mentored by UT Health San Antonio faculty at the time of invention. These policies are described in the UT Health San Antonio Handbook of Operating Procedures (Chapter 12, Intellectual Property). Questions regarding IP can be directed to the Office of Technology Commercialization (210-562-4000).

BME Graduate Program: General Procedure

Preface

The following general policies are predicated on the agreement that during the first year a student is in the BME Program, the University of Texas at San Antonio will be the Home Institution for that student, unless the student has selected a mentor at UT Health San Antonio before the end of the first year at which time UT Health San Antonio would become the Home Institution. Upon identifying either a thesis or a dissertation advisor, the Home Institution for that student will be the one where the advisor has his/her primary faculty appointment in BME.

For some auxiliary services, including but not limited to parking, recreational services, and student identification systems, there may be operational limitations precluding the ability of each Partner Institution to provide reciprocal services to students who have declared another institution as their Home Institution.

1. Parking

- a. All students in this program are expected to know and follow the parking rules and regulations of the Partner Institution where they are attending classes. Such rules include, but are not limited to, campus speed limits, parking zones, police citation and warnings, parking fines and fine appeal procedures, schedule and payment of parking fees, etc.
- b. Parking fees will be paid to the Partner Institution that issues the permit. Students will be eligible for parking permits at each institution where they are enrolled. Students attending classes at a Partner Institution should consult that institution’s parking authority to determine the permit cost or if that Partner Institution has an applicable parking reciprocity agreement.

2. Student Security and Identification

Each Partner Institution establishes and maintains its own protocol, system, and procedure for protecting and identifying official matriculated students. Such identification is normally provided in the form of a numbered picture identification card/badge that must be carried by all registered students and presented to campus police upon request. This card/badge also allows access to certain campus facilities. Authority to issue such identification by campus police is generally part of the enrollment process of each Partner institution. A small fee is normally assessed for the processing and creation of the card/badge. Due to the importance of this card/badge and the fact that students in the BME Program may have to carry several cards/badges, all students should be encouraged to personally check the authenticity of all cards/badges with the appropriate institution authority on a regular basis (i.e.: at least annually).

3. Technology, Technology Support

- a. Technology is heavily used by students and faculty whether classes are on site or online. It becomes even more crucial for students and faculty who are involved in concurrent enrollment or a combination of onsite and online or distance classes. Such technology requires ready and speedy access to technical support for the faculty and students. All Partner institutions have technical support, but access to and protocol for, are unique to each institution. This applies equally to students who may simply need assistance to access the Partner Institution's web portal or assistance with personal laptops and accessing personal student data.
- b. As each Partner Institution has set up their technology system differently, have different software and hardware, have different priority help desks, and have different security measures, it is likely that students may experience technical difficulties and delays. For example, at UT Health San Antonio, students are required to complete a computer-based security training module and be authenticated for network access as part of using a laptop on campus. Accordingly, because of the unique technical policies of the Partner Institutions, each Partner Institution will provide at least the same level of technical assistance, such as a help desk, to the BME Program students as that provided to other students.
- c. Communication with students is paramount especially with a multi institutional program. The current standard of communication is an institution generated email process. To prevent students from inadvertently not receiving emails from all Partner Institutions, each Partner Institution is encouraged to seek and maintain communication with the other Partner Institutions regarding any technical issues that may arise among Partner Institutions that could impact email service for the BME Program students. At present, the students have no choice but to receive emails from both Partner Institution where they are enrolled. All students are assigned UTSA email accounts. UT Health San Antonio will only communicate via Microsoft LiveMail email accounts. BME students receive UT Health San Antonio logins once they are matriculated in the BME program.

Students receive a Microsoft LiveMail account, access to the wireless internet, and access to Library resources. As BME student's they are eligible to call the IMS Service Desk or walk in to any of the Student Support locations when assistance is required. Partner Institutions may wish to collaborate on finding a more unified process.

- e. All policies and procedures must be published as downloadable PDF files on the official BME website. It is the responsibility of UTSA to maintain the BME website. The BME website must be updated at least once per year.

4. Physical Fitness, Wellness, and Recreational Activities

- a. All Partner Institutions have some form of fitness facility and recreational activities supported or provided by the Partner Institution. Monetary support of these facilities/services is usually supported by an approved mandatory student services fee paid with tuition and/or through auxiliary enterprises. The fitness fee is a mandatory fee and will be assessed each semester. This is a pass thru fee and UTHSC does not keep any of the funds. While the Partner Institutions in some of the general policy areas noted above may be able to offer mutual reciprocity, with or without waiver of any fees, some Partner Institutions in this area cannot readily do so due to the very different manner in which fees are assessed and/or collected for this service by that Partner Institution.
- b. In consideration of the above differences in manner or method of fee assessment/collection for services, each Partner Institution will develop its own policy for providing these services for students in the BME program. Respective Partner Institution policies regarding such services will be provided to students at registration. Auxiliary fitness services are self-supporting. Accordingly, all fees charged by a Partner Institution shall have no automatic partner reciprocity.

5. Student Health and Counseling Services

- a. All Partner Institutions provide student health and student counseling services. Methodology, extent, manner of delivery, and location for such services may vary among the Partner Institutions. In each instance however, all students, including those in the BME program, who attend any of the Partner Institutions would pay a medical services fee according to the fee structure of the charging institution. Such fees are generally earmarked for health and counseling in varying degrees.
- b. All Partner Institutions provide institution sponsored student health insurance from the same UT System contracted carrier made available to those students who do not have their own private insurance. The student is required to provide proof of insurance. Therefore, regardless of which Partner Institution is the Home Institution, students who elect to purchase the Home Institution's health insurance will have a reciprocal regional policy useable at the student health facility of any Partner Institution. However, because of policy differences among the Partner Institutions regarding several aspects of student

health services, it is recommended that students use their Home Institution health services unless there is an immediate concern while attending a Partner Institution.

- c. **Immunization.** All incoming students admitted into the BME joint program must adhere to the UTSA and UT Health San Antonio immunization requirements and have their immunizations **completed prior to registration** at UT Health San Antonio and UTSA. Required routine immunizations must be completed **prior to registration** to protect your health and minimize any adverse reactions during the early part of your education. UT Health San Antonio immunization requirements can be found at the Student Health Center's website at <http://shc.uthscsa.edu/> with specific requirements and form at <http://shc.uthscsa.edu/pdf/immunizationrecord.pdf>. Return the above Immunization Record to the Student Health Center at least 30 days prior to registration.
- d. Consistent with the above resulting "regional policy" determination by the same UT System carrier, all Partner Institutions will provide health services to any student in the BME program under the same guidelines and protocol, including fees if applicable and not waived, that are applied to its own students if the BME program students are insured with that carrier. Counseling services, unlike health services, are provided differently among the Partner Institutions. The difference may be in location, service cost, type and level of services, and/or department sponsorship. Because of these differences, it is recommended that students requiring counseling services seek care at their Home Institution unless there is an emergency condition while attending a Partner Institution.

6. Conduct and Discipline

Each Partner Institution maintains policies regarding conduct and discipline for students which may implicate faculty and staff as well. The agreed policy for handling these concerns is to follow the policies and practices of the Partner Institution, where the infraction was committed. If two or more sites are implicated, the most stringent policy, practice or procedure, as determined by the BME COGS, shall apply. In addition, such policies may or may not distinguish between an academic or administrative infraction, and the applicable disciplinary sanctions for either. If no distinction has been determined, or this area is vague or ambiguous, the most stringent policy, practice or procedure among the impacted Partner Institutions shall apply. This information will be provided to all BME program students and BME program faculty/staff.

UT Health San Antonio's Student Conduct and Discipline Policy

<http://catalog.uthscsa.edu/generalinformation/institutionalpolicies/studentconductanddisciplinepolicy/>

UTSA's Student Conduct and Discipline Policy

<http://catalog.utsa.edu/informationbulletin/appendices/studentcodeofconduct/>

Please refer to the links below for grievances at each institution.

UT Health San Antonio's Grievance Policy

<http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/grievances/>

UTSA's Grievance Policy

<http://catalog.utsa.edu/informationbulletin/appendices/studentgrievances/>

7. Library Services

All students in the BME program are expected to utilize and seek services from the library of the Home Institution(s) where they are enrolled. Students will pay library fees to their Home Institution. For students who are also attending classes at Partner Institutions, such Partner Institutions, i.e., for UT Health San Antonio, Director of the Library, will determine if the library fee will be waived and agree to mutual recognition of library privileges for all BME program students regardless of their Home Institution. If this occurs, the Partner Institutions will ensure that a procedure/process exists to accommodate this reciprocity.

8. Admissions/Recruitment Committee

The Admissions/Recruitment Committee consists of a committee chair plus members and BME program faculty, equally divided by each institution. Membership terms are three years. The Admissions/Recruitment Committee is responsible for organizing, and executing all recruiting activities related to the Joint Graduate Program in BME. This includes, but is not limited to, recruiting activities at conferences, undergraduate campuses as well as interactions with program directors and faculty members at the undergraduate campuses. The Admissions/Recruitment Committee will review all applications for admission to the BME Graduate Program, identify the most highly qualified students to interview and/or recommend for admission such applicants to Program Director and Associate Program Director. The Admissions/Recruitment Committee should report recommendations to COGS. All recommendations for admission in both the MS and PhD programs, must be approved **by both the Dean of the Graduate School of Biomedical Sciences at UT Health San Antonio and the Dean of the Graduate School at UTSA.**

9. Curriculum Committee

The Curriculum Committee consists of a committee chair and faculty members from Joint BME program, equally divided with representation from both UTSA and UT Health San Antonio. Membership terms are three years. The Curriculum Committee will be responsible for all aspects of the curriculum: identification, development, and oversight of core courses applicable to all BME students; elimination of redundant courses; request new course approvals, coordinated scheduling of all courses; and evaluation of all courses at both institutions. This committee will interact with the COGS in developing a programs of study and an academic plan-to-degree for both the MS and PhD degrees.

Course Catalog

The Department of Biomedical Engineering offers the Master of Science degree in Biomedical Engineering and the Doctor of Philosophy degree in Biomedical Engineering. Please use the following link to view the 2015-2017 catalog for the Department of Biomedical Engineering. <http://catalog.utsa.edu/graduate/engineering/biomedicalengineering/#text>

Course descriptions for the Department of Biomedical Engineering can be viewed at: <http://catalog.utsa.edu/graduate/engineering/biomedicalengineering/#courseinventory>

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 (UT Health San Antonio). 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 Non-thesis 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, courses can also be taken at The University of Texas Health Science Center at San Antonio (UT Health San Antonio). To enroll in UT Health San Antonio courses ([UT Health San Antonio Catalog](#)), students must register through the [UT Health San Antonio Web site](#). Any questions concerning registration at UT Health San Antonio should be directed to the BME Program Office at UT Health San Antonio. The required curriculum for all students in the Thesis Option is as follows:

A. Core courses:

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Required Core Courses offered at UTSA:

BME 6033 BME Engineering Analysis

Upon approval of the Supervising Professor and the Program Director, students may substitute EGR 5093 (Special Topics in Engineering Analysis) for BME 6033 (BME Engineering Analysis).

BME 6703 Biomedical Imaging

BME 6803 Experimental Biomechanics

BME 6903 Biomaterials

Required Core Courses offered at UT Health San Antonio:

BIME 6004 Biology for Bioengineers

TSCI 5070 Responsible Conduct of Patient-Oriented Clinical Research

B. Research seminar

3

BME 6011 (or BIME 6090 at UT Health San Antonio) is required for three semesters, in order to satisfy the requirements for the Master's degree program in Biomedical Engineering.

C. A minimum of 6 semester credit hours of 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 Elective Courses:

BIO 5433	Neurophysiology
BIO 5483	Computational Neuroscience
BIO 5503	Sensory Physiology
BME 6093	Topics in Biomedical Engineering
BME 6111	Introduction to Clinical Practices
BME 6123	Medical Device Design
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 6303	Computational Oncology and Cancer Treatment Simulations
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
UT Health San Antonio Elective Courses:	
CSBL 5022	Inter-Professional Human Gross Anatomy
CSBL 5095	Experimental Design and Data Analysis
INTD 5005	Core Course I: Biochemistry
INTD 5006	Principles of Cellular and Molecular Biology
INTD 5007	Advanced Cell and Molecular Biology
INTD 5041	Neuroscience – Medical
INTD 5067	Introduction to Bioinformatics and Computational Biology
INTD 6033	Cell Signaling Mechanisms
MICR 5051	Introduction to Immunology
PHAR 5013	Principles of Pharmacology

PHAR 5014	Integrated Physiology and Therapeutics	
PHAR 5019	Metabolism, Hormones, GI Physiology and Therapeutics	
PHAR 5021	Cardiovascular, Renal and Respiratory Physiology and Therapeutics	
PHYL 5013	Dental Physiology	
PHYL 5045	Mammalian Physiology	
PHYL 6091	Selected Topics of Physiology	
RADI 6014	Physics of Dental Imaging	
RADI 6016	Physics of Diagnostic Imaging II	
RADI 6017	Neuroimaging Methods	
RADI 6019	Pulse Sequence Programming for MRI	
RESD 6102	Biomaterials II	
D. A minimum of 6 semester credit hours of biomedical engineering Master's Thesis Research is required.		6
Total Credit Hours		32

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 UT Health San Antonio 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 UT Health San Antonio.

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 program faculty member from UTSA, one BME program faculty member from UT Health San Antonio, and one external member who is not a BME program faculty. For students whose supervising professor is at UTSA, dissertation committee has to be made up of at least 50% membership from UTSA. 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 Master's Thesis and make an official recommendation to the Graduate School of Biomedical Sciences at the UT Health San Antonio or to the Graduate School at UTSA that the Master's degree be awarded.

Degree Requirements and Program of Study – Non-thesis Option

The Non-thesis Option is not offered to new incoming students. All students enrolled in the Non-thesis Option will require approval from the Program Director and the Graduate Advisor of Record. Typically, a Master's degree (Non-thesis 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, courses can also be taken at The University of Texas Health Science Center at San Antonio (UT Health San Antonio). To enroll in UT Health San Antonio courses ([UT Health San Antonio Catalog](#)), students must register through the [UT Health San Antonio Web site](#). Any questions concerning registration at UT Health San Antonio should be directed to the BME Program Office at UT Health San Antonio. The required curriculum for all BME students in the Non-thesis Option is as follows:

A. Core Courses:

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Required Core Courses offered at UTSA:

BME 6033 BME Engineering Analysis

Upon approval of the Supervising Professor and the Program Director, students may substitute EGR 5093 (Special Topics in Engineering Analysis) for BME 6033 (BME Engineering Analysis).

BME 6131 Biomedical Project ¹

BME 6703 Biomedical Imaging

BME 6803 Experimental Biomechanics

BME 6903 Biomaterials

BME 6961 Comprehensive Examination ¹

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

Required Core Courses offered at UT Health San Antonio:

BIME 6004 Biology for Bioengineers

TSCI 5070 Responsible Conduct of Patient-Oriented Clinical Research

B. Research seminar 3

BME 6011 (or BIME 6090 at UT Health San Antonio) 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 selected from the list of electives for the Thesis Option above. Courses from this list may be taken with the approval 15 of the Program Director, Supervising Professor, and course instructor.

Total Credit Hours 36

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 (UT Health San Antonio). 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 beyond the 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, courses can also be taken at The University of Texas Health Science Center at San Antonio (UT Health San Antonio). To enroll in UT Health San Antonio courses ([UT Health San Antonio Catalog](#)), students must register through the [UT Health San Antonio Web site](#). Any questions concerning

registration at UT Health San Antonio should be directed to the BME Program Office at UT Health San Antonio. The minimum required curriculum for all students is as follows:

A. Core Courses:

16

Required Core Courses offered at UTSA:

BME 6033 BME Engineering Analysis ¹

Upon approval of the Supervising Professor and the Program Director, students may substitute EGR 5093 (Special Topics in Engineering Analysis) for BME 6033 (BME Engineering Analysis).

BME 6203 Physiology for Engineers ^{1, 2}

BME 6703 Biomedical Imaging ^{1, 3}

BME 6803 Experimental Biomechanics ¹

BME 6903 Biomaterials ¹

Required Core Courses offered at UT Health San Antonio:

BIME 6004 Biology for Bioengineers ^{1, 2}

CSBL 5095 Experimental Design and Data Analysis

TSCI 5070 Responsible Conduct of Patient-Oriented Clinical Research

RADI 5015 Physics of Diagnostic Imaging I ^{1, 3}

[1] Select any four (4) courses to satisfy core requirements.

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

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

B. Research seminar

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BME 6011 (or BIME 6090 at UT Health San Antonio) is to 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.

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, 9 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 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 6303	Computational Oncology and Cancer Treatment Simulations
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
STA 5103	Applied Statistics

UT Health San Antonio Prescribed Elective Courses:

BIME 6003	Introduction to Clinical Practices
CSBL 5022	Inter-Professional Human Gross Anatomy
INTD 5005	Core Course I: Biochemistry
INTD 5006	Principles of Cellular and Molecular Biology
INTD 5007	Advanced Cell and Molecular Biology
INTD 5041	Neuroscience – Medical
INTD 5067	Introduction to Bioinformatics and Computational Biology
INTD 6033	Cell Signaling Mechanisms
MICR 5051	Introduction to Immunology
PHAR 5013	Principles of Pharmacology
PHAR 5014	Integrated Physiology and Therapeutics
RADI 6014	Physics of Dental Imaging
RADI 6016	Physics of Diagnostic Imaging II
RADI 6017	Neuroimaging Methods
RADI 6019	Pulse Sequence Programming for MRI
RESD 6102	Biomaterials II

D. A minimum of 15 semester credit hours of Doctoral Dissertation, Research and Supervised Teaching is required. 15

E. Students in the program must complete at least 82 semester credit hours for graduation, additional courses such as research hours, dissertation hours, or graduate level electives are often prescribed to make up the remaining hours to meet the program requirement. 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.

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 UT Health San Antonio 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 UT Health San Antonio 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 UT Health San Antonio.

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 program faculty member from UTSA, one BME program faculty member from UT Health San Antonio, one non-BME program faculty member from either UTSA or UT Health San Antonio and one member from outside of both institutions. For students whose supervising professor is at UTSA, dissertation committee has to be made up of

at least 50% membership 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; and
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 UT Health San Antonio 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/UT Health San Antonio Joint Graduate Program in Biomedical Engineering.

University of Texas Health Science Center at San Antonio Compact Between Graduate Students and Their Supervising Professors

Graduate training entails both formal education in advanced scientific knowledge and theory as well as research training under the supervision of one or more investigators who are qualified to fulfill the responsibilities of a mentor. A positive mentoring relationship between the graduate student and the supervising professor is a vital component of the student's preparation for a successful biomedical career.

Individuals who pursue a biomedical graduate degree are expected to take responsibility for their own scientific and professional development. Faculty who advise students are expected to fulfill the responsibilities of a mentor, including the provision of scientific training, guidance, instruction in the responsible conduct of research and research ethics, and financial support.

This compact offers a set of guiding principles intended to promote and support the development of a positive mentoring relationship between the graduate student and his/her supervising professor(s). (Ph.D. students only: this compact should also include the completed program-specific individualized **Milestone Agreement Form**. As mandated by the U.T. System, the individualized Milestone Agreement Form should be in an electronic form consistent with Family Educational Rights and Privacy Act (FERPA) and provided by the program for the purpose of informing students about the milestones that they are expected to reach to earn a Ph.D.)

Within 4 weeks of formally selecting a supervising professor, students should have discussed with their mentor each of the topics listed on pages 2 – 4 and submitted the form to the COGS chair. To tailor an individualized compact best suited for each student and mentor, specific commitments by both the student and the mentor, detailed processes, additions and specifications should either be added in the space below each topic or in an addendum as deemed appropriate.

With their signature, both the mentor and the students confirm that all topics listed have been discussed and they are committed to uphold the principles agreed upon in this individualized compact. Once approved by COGS, the compact will be placed in the student's file held in the department's office.

It is understood that various aspects of the student's pursuit of their degree can change over time and therefore the compact should be reviewed regularly (at least once a year) and modified as needed. The Milestone Agreement Form is to be updated annually.

DEFINING STUDENT AND MENTOR RESPONSIBILITIES AND EXPECTATIONS

Frequency and Methods of Communication between Mentor and Student (How often will student and mentor meet? How should updates or changes in expectations and issues be communicated?)

Research/Training Related and Professional Development of the Student (What is the student's project? Is there a specific person that will oversee training other than the PI and to what degree will the student assist with other projects in the lab? What constitutes professional development?)

Common Laboratory Responsibilities (Which tasks and duties are shared among all lab members, including the student?)

Notebooks and Data (What is the policy of the laboratory related to the storage of data and laboratory notebooks?)

Work Hours/Attendance in the Laboratory (How many hours per week is the student expected to work in the laboratory?)

Authorship Policies (What is the policy that constitutes authorship in the lab? How is the order of authors determined in a manuscript or abstract?)

Manuscripts expected for Graduation (Are there specific expectations for the number of manuscripts (published, submitted and/or in preparation), and the student's authorship position (e.g. first) on these manuscripts, required for the student to graduate?)

Intellectual Policy Issues: Disclosure, Patent Rights and Publishing Research Discoveries (What is the policy for patents that come out of the student's work?)

Selection of a Thesis/Dissertation Committee (What is the process for determining the subject of the thesis/dissertation and the composition of the thesis/dissertation committee?)

Attendance of Professional and Scientific Meetings (Under which conditions can a student travel to a Regional, National, or International scientific meeting? For example, only if the student or student's work is presenting? Who covers the cost and what will be covered?)

Career and Professional Development / Job Search and Placement / Individualized Career Development Plan (What is the career choice of the student and what arrangements can be made to allow the student to participate in courses, workshops, etc. for their particular interests without compromising their research training?)

Time off for Illness or University Holidays – Vacation Policy (HOP 4.3.5; 4.7.14) (What is the laboratory policy for vacations, holidays, and personal days?)

Conflict Resolution and Student Complaint Policies (refer to [Student Catalogues](#); [GSBS website](#))

Additional Topics

Milestone Agreement Form

(insert the approved Milestone Agreement for the student's program)

We have discussed all the above topics and made the mutually agreed upon additions, specifications and changes.

We acknowledge our joint intention to re-evaluate the compact, the agreed upon milestones and the degree completion date at least once a year throughout the student's period of academic standing.

Student's Name

Signature of Student Date

Supervising Professor's Name

Signature of Supervising Professor Date

This compact has been adapted from the [UT System Health Institutions Compact Between Graduate Students and Their Research Advisors](#) and the [AAMC's Compact Between Biomedical Graduate Students and Their Research Advisors](#) (December 2008).

Key Milestones For Obtaining A PhD Degree in Biomedical Engineering

(minimum of 82 semester hours)

Note: Students are required to have at least 1 manuscript published/accepted/in press by a peer-reviewed Journal as part of the degree program

1st Semester (Fall)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Search and select a research mentor
2nd Semester (Spring)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Begin discussion with your research mentor on your dissertation work 3. Make necessary steps to take QE exam (Letter of Intent Due - Mar 15; Submit QE Proposal – Due May 15)
3rd Semester (Summer)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Take QE exam (One week before Fall semester begins) 3. Continue to collect preliminary data for your proposed dissertation work
4th Semester (Fall)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect preliminary data for your proposed dissertation work 3. Work with research mentor to select Dissertation Committee members 4. Request written approval from the BME program for your thesis committee members and mentor selection 5. Submit documentations to the Graduate School for approval of your thesis committee members and mentor^{^,+} 6. Begin writing Dissertation proposal
5th Semester (Spring)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Complete your written Dissertation proposal and submit to research committee members[%] 3. Defend your Dissertation proposal^{*,#} 4. Submit documentations to the Graduate School for admission to candidacy (approval of thesis by research committee members) 5. Continue to collect data for your dissertation
6th, 7th, etc Semesters	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect data for your dissertation
2nd to Last Semester	<ol style="list-style-type: none"> 3. Register for courses (core and elective) courses 4. Register for Doctoral Dissertation (BME 7991,2,3,6)** 5. Continue and complete data collection for your dissertation work 6. Begin writing your dissertation 7. Submit and work with research mentor on draft dissertation 8. Submit Program of Study to College of Engineering Dean's Office/BME program office for approval
Last Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Register for Doctoral Dissertation (BME 7991,2,3,6)** 3. Apply for Graduation[@] 4. Complete your written dissertation and submit to research committee members[%] 5. Defend your Dissertation^{*,#} 6. Submit documentations to the Graduate School for successfully completing your dissertation 7. Submit finalized Dissertation to the Graduate School after defense and approval from your research committee^{@,^}

[%]All members of the committee have to conform to the BME guidelines

^{*}All members of the committee needs to be appointed to the Graduate School (No members can be appointed during the summer semester)

^{*}Flyer for the public defense of the proposal/dissertation has to be electronically sent to all BME faculty and students **at least 3 weeks** before the day of the defense.

[#]Flyer for the public defense of the proposal/dissertation has to be electronically sent to all BME faculty and students **at least 3 weeks** before the day of the defense.

[%]Written proposal/dissertation has to be given to your research committee members **at least 2 weeks** before the day of the defense.

[@]Check with Graduate School (website or catalog) for deadlines

^{**}Registration of a minimum of 1 Dissertation hour is required in the graduating semester.

[^] In addition to the Graduate School requirements, students are required to submit 2 bound copies of the finalized Thesis to the BME program office (one for the BME office at UTSA and another one for the BME office at UTHSCSA).

Key Milestones For Obtaining A PhD Degree in Biomedical Engineering

(minimum of 82 semester hours)

Note: Students are required to have at least 1 manuscript published/accepted/in press by a peer-reviewed Journal as part of the degree program

1 st Semester (Spring)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Search and select a research mentor
2 nd Semester (Summer)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect preliminary data for your proposed dissertation work
3 rd Semester (Fall)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Begin discussion with your research mentor on your dissertation work 3. Make necessary steps to take QE exam (Letter of Intent Due - Oct 15; Submit QE Proposal – Due Dec 1)
4 th Semester (Spring)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Take QE exam (One week before Spring semester begins – usually first week of January) 3. Continue to collect preliminary data for your proposed dissertation work
5 th Semester (Fall)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect preliminary data for your proposed dissertation work 3. Work with research mentor to select Dissertation Committee members 4. Request written approval from the BME program for your thesis committee members and mentor selection 5. Submit documentations to the Graduate School for approval of your thesis committee members and mentor^{6,+} 6. Begin writing Dissertation proposal
6 th Semester (Spring)	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Complete your written Dissertation proposal and submit to research committee members⁵ 3. Defend your Dissertation proposal⁵ 4. Submit documentations to the Graduate School for admission to candidacy (approval of thesis by research committee members) 5. Continue to collect data for your dissertation
7 th , 8 th , etc Semesters	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect data for your dissertation
2 nd to Last Semester	<ol style="list-style-type: none"> 3. Register for courses (core and elective) courses 4. Register for Doctoral Dissertation (BME 7991,2,3,6)** 5. Continue and complete data collection for your dissertation work 6. Begin writing your dissertation 7. Submit and work with research mentor on draft dissertation 8. Submit Program of Study to College of Engineering Dean's Office/BME program office for approval
Last Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Register for Doctoral Dissertation (BME 7991,2,3,6)** 3. Apply for Graduation[@] 4. Complete your written dissertation and submit to research committee members⁵ 5. Defend your Dissertation⁵ 6. Submit documentations to the Graduate School for successfully completing your dissertation 7. Submit finalized Dissertation to the Graduate School after defense and approval from your research committee^{@,^}

⁶All members of the committee have to conform to the BME guidelines

⁺All members of the committee needs to be appointed to the Graduate School (No members can be appointed during the summer semester)

^{*}Flyer for the public defense of the proposal/dissertation has to be electronically sent to all BME faculty and students at least 3 weeks before the day of the defense.

[#]Flyer for the public defense of the proposal/dissertation has to be electronically sent to all BME faculty and students at least 3 weeks before the day of the defense.

⁵Written proposal/dissertation has to be given to your research committee members at least 2 weeks before the day of the defense.

[@]Check with Graduate School (website or catalog) for deadlines

^{**}Registration of a minimum of 1 Dissertation hour is required in the graduating semester.

[^]In addition to the Graduate School requirements, students are required to submit 2 bound copies of the finalized Thesis to the BME program office (one for the BME office at UTSA and another one for the BME office at UTHSCSA).

Key Milestones For Obtaining A MS Degree (Thesis) in Biomedical Engineering (minimum of 32 semester hours)

Note: Students are required to present at least one abstract at national/regional/international conference as part of the degree program

1st Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Search for a research mentor
2nd Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Begin discussion with your research mentor on your thesis work
3rd Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Continue to collect preliminary data for your proposed thesis work 3. Work with research mentor to select Thesis Committee members 4. Request written approval from the BME program for your thesis committee members and mentor selection 5. Submit documentations to the Graduate School for approval of your thesis committee members and mentor selection^{&,*} 6. <u>Begin writing Thesis proposal</u>
4th Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Register for Master's Thesis Research (BME 6981,2,3,6)^{**} 3. Complete your written thesis proposal and submit to research committee members[%] 4. Defend your Thesis proposal^{*,#} 5. Submit documentations to the Graduate School for admission to candidacy (approval of thesis by research committee members) 6. Continue to collect data for your proposed thesis work
5th Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Register for Master's Thesis Research (BME 6981,2,3,6)^{**} 3. Continue and complete data collection for your proposed thesis work 4. Begin writing your thesis 5. Submit and work with research mentor on draft thesis 6. <u>Submit Program of Study to College of Engineering Dean's Office/BME program office for approval</u>
6th Semester	<ol style="list-style-type: none"> 1. Register for courses (core and elective) courses 2. Register for Master's Thesis Research (BME 6981,2,3,6)^{**} 3. Apply for Graduation[@] 4. Complete your written thesis and submit to research committee members[%] 5. Defend your Thesis^{*,#} 6. Submit documentations to the Graduate School for successfully completing your thesis 7. Submit finalized Thesis to the Graduate School after defense and approval from your research committee^{@,^}

[&]All members of the committee have to conform to the BME guidelines

⁺All members of the committee needs to be appointed to the Graduate School (No members can be appointed during the summer semester)

^{*}Flyer for the public defense of the proposal/thesis has to be electronically sent to all BME faculty and students at least 3 weeks before the day of the defense.

[#]Flyer for the public defense of the proposal/thesis has to be electronically sent to all BME faculty and students at least 3 weeks before the day of the defense.

[%]Written proposal/thesis has to be given to your research committee members at least 2 weeks before the day of the defense.

[@]Check with Graduate School (website or catalog) for deadlines

^{**}Minimum of 6 Thesis Research hours required for the degree. Students typically register these hours over 2 semesters (minimum). **Registration of a minimum of 1 Thesis Research hour is required in the graduating semester.**

[^]In addition to the Graduate School requirements, students are required to submit 2 bound copies of the finalized Thesis to the BME program office (one for the BME office at UTSA and another one for the BME office at UTHSCSA).

**Key Milestones For Obtaining A
MS (Non-Thesis) Degree in Biomedical Engineering⁺**
(minimum of 36 semester hours)

1st Semester	1. Register for courses (core and elective) courses [*]
2nd Semester	1. Register for courses (core and elective) courses [*]
3th Semester	1. Register for courses (core and elective) courses [*] 2. Submit Program of Study to College of Engineering Dean's Office/BME program office for approval
4th Semester	1. Register for courses (core and elective) courses [*] 2. Register for Comprehensive Exam 3. Apply for Graduation [@]

⁺The number of semesters required for graduation will depend on the number of semester hours registered per semester (Full-time = minimum of 9 hrs/semester)

^{*}Check with Catalog for required core and elective courses

[@]Check with Graduate School (website or catalog) for deadlines