

The University of North Texas (UNT) offers a unique Ph.D. program in Biomedical Engineering (BMEN) to produce multi-faceted, new Ph.D. graduates who will fulfill unmet healthcare-related, startup industry needs in the North Texas area specifically and the state of Texas in general. The proposed degree program is aligned with UNT's strategic plan to retain its Carnegie Tier 1 Research University status in the coming years.

The educational objectives of this Ph.D. program are twofold: 1) to prepare Ph.D. graduates to conduct and continue research into new unexplored fields that can revolutionize the healthcare-technology sector; and 2) to educate Ph.D. students on innovation, business knowledge, and technology transfer to enable them to create new and disruptive healthcare startups that can improve the quality of life for the people of Texas, the US, and the world. Students will have the option of choosing one of two tracks: 1) a traditional research track that enables them to get a graduate minor in another engineering or computer science or biology or performance arts health (music in medicine), with the added feature of organized training to teach after graduation; (2) a healthcare startup track that enables the students to take 4 courses in business, allied to startup management.

The BMEN department aims to educate our Ph.D. students to become innovators of high-tech healthcare ventures of the future, which will increase the visibility of the DFW region, Texas, and the Nation, through technology translation, entrepreneurial endeavors and most importantly, job creation.

The Ph.D. program will admit students with a Bachelor's degree in Biomedical Engineering or related discipline. The admission criteria include:

- a. Undergraduate GPA  $\geq 3.5$
- b. GRE  $\geq 305$  (combined) [GRE will be waived for UNT graduates and/or students graduating from an ABET accredited program]
- c. TOEFL and IELTS requirement will be same as MS degree for international students

For students with a MS degree in Biomedical Engineering or related discipline, the admission criteria include:

- a. MS GPA  $\geq 3.5$
- b. GRE  $\geq 305$  (combined) [GRE will be waived for UNT graduates and/or students graduating from an ABET accredited program]
- c. TOEFL and IELTS requirement will be same as MS degree for international students

1. **Ph.D. Track geared towards research and academia:**

Students embarking on this doctoral program will have a variety of sub-tracks or options to avail of. Students can choose any one of the following sub-tracks:

- a. Biomaterials
- b. Bioinstrumentation
- c. Biomechanics
- d. Biocomputing
- e. Biotechnology
- f. Music in Medicine

Accordingly, students may choose their electives (3) from one of the following: Materials Science and Engineering (MTSE); Electrical Engineering (EE); Mechanical Engineering (MEEN); Computer Science (CS); Biology (BIOL); Performance Arts Health (MUPH) from the College of Music. Thus, students will get a graduate minor in any of these disciplines, in addition to their Ph.D. degree. The graduate minor will enable students to gain a depth of knowledge in their area of research, thus making them valued subject matter experts. In addition, students will be required to take a course in Instructional Service or Teaching Practicum, that will prepare them for curriculum development and teaching courses in an effective manner. The degree plan is as follows:

**Ph.D. in Biomedical Engineering after BS in Biomedical Engineering or related engineering field:**

**Seminar (3 SCH)**

BMEN 5940 – Seminar (1)

BMEN 6940 – Ph.D. seminar (2)

**BMEN Focus Area**, one course from any of the following: (3 SCH)

Bioinstrumentation; Biomaterials; Biomechanics; Biocomputing; Biotechnology

**Electives in BMEN:** (15 SCH)

5 BMEN graduate-level (5000-level) courses, to be determined by student and advisor

**BMEN 6920:** (3 SCH)

Instructional Service includes preparation for teaching an undergraduate BMEN course with instructional feedback and mentoring.

**Individual Research:** (6 SCH)

**Dissertation:** (12 SCH) Minimum

**Electives in chosen sub-track:** (9 SCH)

Graduate-level electives from MTSE/EE/MEEN/CS/BIOL/MUPH

**TOTAL SCH: 51 Minimum**

**Ph.D. in Biomedical Engineering after MS in Biomedical Engineering or related engineering field:**

**Seminar** (2 SCH)

BMEN 6940 – Ph.D. seminar (2)

**BMEN Focus Area**, one course from any of the following: (3 SCH)

Instrumentation; Imaging; Biomaterials; Nanotechnology; Biomechanics

**Electives in BMEN:** (9 SCH)

3 BMEN graduate-level (5000-level) courses, to be determined by student and advisor

**BMEN 6920:** (3 SCH)

Instructional Service, includes preparation for teaching an undergraduate BMEN course with instructional feedback and mentoring.

**Individual Research: (3 SCH)**

**Dissertation: (12 SCH) Minimum**

**Electives in chosen sub-track: (9 SCH)**

Graduate-level electives from MTSE/EE/MEEN/CS/BIOL/MUPH

**TOTAL SCH: 41 Minimum**

1. **Ph.D. Track geared towards start-up management:**

Students embarking on this doctoral program will have the unique opportunity to take their innovative research and spin it off into a start-up company. Doctoral students will take relevant courses pertaining to creating and running a start-up company from the G. Brint Ryan College of Business. The courses will provide them with the knowledge and foundation necessary to embark on the path of entrepreneurship. In addition, students will be required to take a course in Translational Biomedical Engineering that will prepare them on various aspects of translating their research into a start-up company. The degree plan is as follows:

**Ph.D. in Biomedical Engineering after BS in Biomedical Engineering or related engineering field:**

**Seminar (3 SCH)**

BMEN 5940 – Seminar (1)

BMEN 6940 – Ph.D. seminar (2)

**BMEN Focus Area**, one course from any of the following: (3 SCH)

Bioinstrumentation; Biomaterials; Biomechanics; Biocomputing; Biotechnology

**Electives in BMEN:** (15 SCH)

5 BMEN graduate-level (5000-level) courses, to be determined by student and advisor

**BMEN 6930:** (3 SCH)

Translational Biomedical Engineering

**Individual Research:** (6 SCH)

**Dissertation:** (12 SCH) Minimum

**Graduate-level Electives from College of Business:** (12 SCH)

**TOTAL SCH: 54 Minimum**

**Ph.D. in Biomedical Engineering after MS in Biomedical Engineering or related engineering field:**

**Seminar (2 SCH)**

BMEN 6940 – Ph.D. seminar (2)

**BMEN Focus Area**, one course from any of the following: (3 SCH)

Bioinstrumentation; Biomaterials; Biomechanics; Biocomputing; Biotechnology

**Electives in BMEN: (9 SCH)**

3 BMEN graduate-level (5000-level) courses, to be determined by student and advisor

**BMEN 6930: (3 SCH)**

Translational Biomedical Engineering

**Individual Research: (3 SCH)**

**Dissertation: (12 SCH) Minimum**

**Graduate-level Electives from College of Business: (12 SCH)**

**TOTAL SCH: 44 Minimum**

In addition to credit hours requirements, Ph.D. students must complete the following.

## **Residence requirement**

Students are required to enroll in at least 9 credit hours for two consecutive terms/semesters or in at least 6 credit hours for three consecutive terms/semesters.

## **Dissertation advisory committee formation**

Students admitted to the Ph.D. program will be required to form a committee comprising a BMEN faculty advisor and 3 other committee members (BMEN faculty). Students on the start-up track will need to include an additional advisor from industry. The BMEN department will suggest names for the industry advisor.

## **Ph.D. qualifying requirements**

Biomedical engineering core courses need to be completed with a grade of B or better. An oral Ph.D. qualifying examination is conducted by the student's dissertation advisory committee to ensure the research readiness of the student. All students will be required to complete their qualifying exam within 1 year of joining the program. The qualifying exam will be determined by the BMEN advisor and the committee. Students will also be required to make an oral presentation on their research plans.

Students who fail the qualifying exam will get one more opportunity to pass their qualifying exam. Failure in both attempts will result in the student being discontinued from the Ph.D. program.

## **Dissertation proposal defense**

An oral dissertation proposal defense is conducted by the doctoral candidate's dissertation advisory committee. The dissertation proposal defense must be conducted at least six months before the dissertation defense.

## **Dissertation defense**

An oral dissertation defense is conducted by the doctoral candidate's dissertation advisory committee. Students must apply for graduation prior to the defense of the dissertation. Graduation information and deadlines are available from the [Toulouse Graduate School](#).