

For the M.S.

A minimum of 30 credit hours is required for the Master of Science degree, which may be met by satisfying the requirements for a Thesis-Based or Project-Based program of study. BME courses include BME 500-level or 4000-level courses (except BME 4300. MQP Capstone Design). Electives may include any WPI graduate-level engineering, physics, math, biomedical engineering, or equivalent course (500- or 4000-level), subject to the approval of the department Graduate Studies Committee. A maximum of 8 credits of coursework at the 4000-level may be applied to meet the requirements for the Master of Science degree.

M.S. (Thesis-Based)	30 credits
BME courses	12 credits
BME 599 (M.S. Thesis)	6 credits minimum
Electives	12 credits
M.S. (Project-Based)	30 credits
BME courses	12 credits
BME 597 (M.S. Project)	6 credits
Electives	12 credits

BME courses: BME courses are defined as any course with a BME designator.

Thesis (6 credits, Thesis-Based M.S.)

The Thesis-Based M.S. program requires a minimum of 6 credits of **BME 599. Master's Thesis** and completion of an independent research project under the supervision of a Biomedical Engineering Program Faculty advisor. This option is well-suited for the student seeking to engage in deeper, open-ended inquiry into a research area, in preparation for advanced research training (e.g., Ph.D. degree) or research-focused career opportunities in a medical, academic, government, or industry laboratory setting.

Project (6 credits, Project-Based M.S.)

The Project-Based M.S. program enables students to engage in a focused, credit-based independent project experience that builds on their individual professional and academic experience. The program will facilitate development of experience, skillset, and mindset to contribute and lead in industry as engineers in a variety of biomedical engineering roles. The Project-Based M.S. program requires completion of 6 credits of **BME 597. Professional Project**, and completion of a capstone deliverable representative of their integrated project experience (e.g., poster or platform presentation, department seminar, final presentation, online portfolio). The Project may include one or more integrated project-based experiences:

- 1) **BME 5900. Internship or Co-op.** Students may apply for an industry-based co-op or internship, and earn academic credit while using elements of the co-op or internship as the basis for satisfying the project requirement.
- 2) **BME 5910. Master's Design Project.** Students may work with a faculty advisor to design a device or prototype that meets a specific set of technical objectives.

- 3) **BME 5920. Clinical Preceptorship.** Students may work with faculty advisors in collaboration with clinicians (including medical, dental, veterinary) to design a device, system, or other product that creates value with positive impact on clinical practice.

In addition, the following requirements must be met for both Master of Science degree programs:

- **Technical Depth Requirement (15 credits minimum).** Thematically-related advanced engineering and science coursework in an area of technical focus within a Biomedical Engineering specialization. No more than one life sciences or regulatory course may be applied towards this requirement, and the course must be relevant to the depth area. Up to 3 credit-hours of a Thesis or Project may be designated as technical depth.
- **Seminar Requirement.** Students must take BME 591. Graduate Seminar (0 credits) and pass it twice.
- **BME Core Competencies.** In addition to meeting the specified minimum credit requirements for the degree program, all Master of Science candidates must satisfy five (5) BME Core Competencies.
 - 1) **Mathematics.** Understanding and ability to apply fundamental principles of mathematics (e.g., statistics, numerical methods, or computational modeling).
 - 2) **Life science.** Understanding and ability to apply fundamental principles of life science (e.g., cell and molecular biology, physiology).
 - 3) **Clinical needs analysis and design.** Ability to communicate effectively with clinical stakeholders, understanding of healthcare systems, exposure to clinical environments and practice, understanding clinical needs and recognizing opportunities to improve healthcare delivery and practice.
 - 4) **Regulation and controls.** Understanding of regulations and standards applied to biomedical engineering design, manufacturing, and research (e.g., medical device design regulations, FDA regulations, engineering standards, QC/QA, GMP/GLP).
 - 5) **Value creation, innovation, technology commercialization.** Development and practice of innovation mindset and skillset to create value and recognize opportunities for innovation in the design and development of medical technologies; commercial and clinical translation of medical innovations that impact healthcare delivery and practice.

Core Competencies. To aid students in developing a Plan of Study, the following example courses that can fulfill each of the five (5) BME Core Competencies are provided. Alternative courses may be applied to fulfill competency requirements. Students need only take one (1) course to fulfill a given competency. Alternatively, waivers may be considered based on documented work experience, advanced degrees, majors, or minors that demonstrate advanced mastery in the core competency area. Course substitutions and waivers must be approved by the department Graduate Studies Committee. If approved, a Thesis or Project may be used to fulfill up to two (2) Competencies.