

# Ph.D. in Biomedical Engineering

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Students may enter this joint Ph.D. degree program (“Joint Degree Program”) from varied backgrounds. The Joint Degree Program acknowledges this characteristic of the target student audience, and adopts the following requirements in course credits depending on each student’s background at entry:

- (1) Students entering the Joint Degree Program after they have earned an M.S. degree in Biomedical Engineering are required to complete at least 24 semester credits in graduate-level courses.
- (2) Students who have earned an M.D., D.M.D., D.V.M., or other medical/clinical doctorate, and students entering with an M.S. degree not in Biomedical Engineering may be required to complete up to an additional 12 graduate level course credits (for a total of up to 36 course credits), based on individual considerations as determined by the Steering Committee Co-Directors and in consultation with the student’s thesis advisor.
- (3) Students may also be admitted directly to the Joint Degree Program after earning a B.S. degree. In this case, they will be required to complete additional 12 graduate-level course credits compared to students entering the program with an M.S. degree (for a total of up to 36 course-credits).
- (4) In all cases, the total of all graduate-level coursework must be completed with a cumulative GPA of 3.0 or higher.
- (5) There is no stipulated minimum requirement for dissertation research credits. The student, however, will follow the requirements for registration for dissertation research credits as it pertains to his/her primary institution.

Every student must attempt and pass a qualifying examination. The format and requirements for this exam will be updated from time to time by the Joint Degree Program’s Steering Committee subject to approvals by the partnering institutions through their normal processes. Currently, the qualifying exam consists of 2 parts: (1) a written research proposal in the NIH proposal format, and (2) an oral defense of the written proposal and accessory topics.

- (1) Students who have earned a M.S. degree can take the qualifying examination at the end of their first year in the Joint Degree Program. They must take the exam by the end of their second year in the Joint Degree Program. There is no minimum for the number of credits that a student must complete prior to taking the exam.
- (2) Students who have earned a baccalaureate degree (but not a graduate degree) will take the qualifying examination at the end of their second year in the Joint Degree Program.
- (3) Students may take the qualifying examination prior to taking IBMS (if deferred) with permission from the Joint Degree Program’s Steering Committee Co-Directors.

Directed research. The research will be supervised jointly by Rutgers SGS-BHS and NJIT graduate faculty, in accordance with the requirements established for the joint Ph.D. degree. The research must culminate in the successful preparation of a written dissertation of publishable quality, which must be defended orally at a public meeting. The Dissertation Examination Committee will be formed according to the policies of the student’s primary institution, but must include at least one faculty member from Rutgers SGS-BHS, one faculty member from NJIT, and one of whom is external to the Ph.D. program. The requirements for presentations and forums (e.g., presentation of dissertation proposal, dissertation defense) will be administered according to the regulations of the student’s primary institution. The protection of the dissertation content and the publication, utilization and protection of the involved research activities will be subject to the regulations of the primary institution. If required, specific agreements will be arranged for the allocation and protection of intellectual property.

A student’s program of graduate coursework must fulfill published requirements that will be updated from time to time by the Joint Degree Program’s Steering Committee, subject to approvals by the partnering institutions through their normal processes. According to the current agreement:

- (1) Students entering the program with an M.S. degree in Biomedical Engineering are required to take a minimum of 24 semester credits of graduate level courses.
  - At least 9 credits of biomedical engineering coursework shall be selected in the field of specialization chosen by the student.
  - At least 9 credits of biomedical sciences to include:
    - Foundation coursework appropriate to the field of specialization
      - a) Introduction to Biomedical Science (IBMS, GSND5200Q) for 5 credits. This is the default required course.
      - b) If appropriate, the student’s advisor may petition the steering committee to replace this course with one of the following:
        - i) Fundamentals of Neuroscience (NEUR5200Q) and Foundations of Integrative Human Physiology (CBNP 5165Q) for 5 credits
        - ii) Fundamentals of Neuroscience (NEUR5200Q) and Fundamentals of Human Physiology (PHPY5005Q) for 6 credits
    - Professional Skills II, Grantsmanship Skills (GSND5006Q) for 2 credits
    - Research Design and Statistics (GSND5135Q) for 2 credits
    - The remaining 6 credits can be any relevant science or engineering course depending on area of research focus.
- (2) All students must have had one (1) course on responsible conduct of research. The course can be GSND5001Q or an equivalent. This course can count towards the “remaining 6 credits” in section 1.
- (3) Each student must undergo at least 2 laboratory rotation experiences, at least one at each one of the partnering institutions.
- (4) Registration and satisfactory attendance at seminars as required by the primary institution.
- (5) In specific cases, students with an engineering background may need preliminary study prior to taking the IBMS course. The IBMS course may be deferred to the second year of the program with approval of the Steering Committee Co-Directors.
- (6) Among the graduate courses, at least 12 semester credits must be at the advanced graduate level (as determined by the Steering Committee Co-Directors, after consultation with the graduate faculty at both partnering institutions).

(7) Students entering with a B.S will be required to take 12 additional graduate level course credits, with a minimum of 6 course credits from NJIT and the additional 6 from either campus depending on the student's research focus and in consultation with the members of the Dissertation Committee.