

## MS Program Description

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Students and faculty associated with Clemson University's Medical Biophysics Graduate Program (MBGP) use the language and tools of physics, medicine, genetics, biochemistry, mathematics, physical chemistry, and molecular and cellular biology to understand fundamental physical principles underlying complex biological and medical phenomena, and the application of these principles in solving biomedical problems.

Students in the MBGP perform collaborative, highly interdisciplinary research in multiple Clemson departments and colleges and through partnerships with the Health Sciences Center at PRISMA Health, the Clemson Center for Human Genetics, the Clemson Genomic Institute, the Eukaryotic Pathogen Innovations Center, and the Center of South Carolina Translational Research Improving Musculoskeletal Health. The graduate training provided by the MBGP prepares students for careers bridging fundamental science and medicine. The MBGP is an independent graduate program. MBGP students work with an interdisciplinary group of researchers and have access to resources of all participating departments, colleges, and research centers associated with Clemson University.

The Professional Master of Science in Medical Biophysics is designed for individuals seeking employment in biomedical industry. Examples include pharma and biotech companies involved in drug discovery, software development, gene sequencing and analysis, sample analysis and testing, among many others.

Successful students in the MBGP at Clemson University are expected to come from many different scientific backgrounds and the curriculum is designed with the flexibility to meet student-specific goals. Students take four required courses during their first year and choose from a large and growing range of elective courses in subsequent years so their training is tailored specifically to desired research interests. The MBGP is designed so students spend the maximum amount of time in research training rather than in the classroom.

## Summary of Degree Requirements

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The Master of Science degree in Medical Biophysics requires a minimum of 30 credits. Students must earn a *B* average or higher in the core courses.

## Coursework

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During their first year, students take the following courses:

- [MBIO 8100 - Molecular and Cellular Medical Biophysics 3 Credits](#)
- [MBIO 8110 - Medical Biophysics at Larger Scale: Tissues and Organs 3 Credits](#)
- [MBIO 8210 - Medical Biophysics and Human Health 3 Credits](#)
- [MBIO 8220 - Medical Biophysics Seminar Series 3 Credits](#)

Students also participate in a rotation of faculty labs (a minimum of three credits each in [MBIO 9910](#)) for a total of 12 credits.

Elective courses may be selected by the student and advisory committee from courses in fields such as bioengineering, biology, chemical and biomolecular engineering, chemistry, computer science, genetics and biochemistry, materials sciences, mathematical sciences, physics, or plant and environmental sciences, or various lectures and seminars offered by PRISMA Health. List of available elective courses is provided here.

## **Outcomes, Learning Objectives, and Graduation Requirements**

**Outcomes:** Graduated students are expected to be fully prepared to successfully practice Medical Biophysics in industry and other related fields. They will support the growth of and be employed by the medical biophysics industry and related fields within South Carolina and USA. The program will maintain a total enrollment sufficient to ensure program viability and program quality.

**Learning Objectives:**

- (1) An ability to identify, formulate, and solve complex problems in the field of Medical Biophysics.
- (2) An ability to develop and conduct computational and experimental investigations, analyze and interpret data, and use scientific judgment to draw conclusions.
- (3) An ability to apply Medical Biophysics knowledge in drug design, to produce solutions that meet specified needs of Pharmaceutical and Medical industry and to carry research in bio-oriented areas.
- (4) An ability to apply Medical Biophysics knowledge to problems and discoveries that are of interest of pharmaceutical and medical industries and general biophysical science. This will be targeted via the MBIO 9910 course with topics aligned with particular needs.

**Graduation Requirements:**

- (1) Successful completion of core courses with course grade “B” or higher.
- (2) The MS in Medical Biophysics program requires that each student completes at minimum 30 credits in courses.
- (3) Several talks/posters at regional/national meetings, which demonstrate the ability to address a complex problem in the field as determined by an internally developed rubric.
- (4) MBIO 991 Keystone Assignment: completion of a research project that demonstrates the student’s ability to develop and conduct appropriate computational and/or experimental investigations, analyze data and draw conclusions.
- (5) Assessment of student’s performance in core coursework and final exams on topics related to drug discovery (Pharmaceutical component), genetic origin of human diseases and Personalized Medicine (Medical component) and basic biophysical science.