BIOMATERIALS SCIENCE (MS)

NYSED: 80132 HEGIS: 1224.00 CIP. 14.0501

Program Description

The MS degree in Biomaterials Science is awarded by the New York University College of Dentistry (NYU Dentistry) with courses offered by the NYU Dentistry Department of Molecular Pathobiology, Division of Biomaterials and Regenerative Biology.

The mission of the program is to provide education and training in biomaterials science and immersion in state-of the art technology, while ultimately contributing to improving human health through biomaterialsbased treatment modalities.

The goals of the program are to:

- Provide students with state-of-the-art knowledge and training in biomaterials science that will prepare them for careers in research and development in academia and industry
- Enhance the students' understanding of biomaterials-based treatment modalities by providing them with a broad background in biomaterials structure, fabrication, function and interactions with cells and tissues
- Serve as a basis for further advanced studies, e.g. PhD programs in biology, physical and health sciences
- Provide clinicians with the knowledge required for materials selection and application

The Department is located at the New York University College of Dentistry, a world-class craniofacial research and healthcare institution, and the largest dental school in the world. The Biomaterials Division within the Department of Molecular Pathobiology is uniquely positioned to build upon its existing strengths in biomaterials fabrication, characterization, and testing to achieve the goals of the program and to bridge the gap between bench top research and clinical application. Our new, state-ofthe-art facility is located on First Avenue between E. 25th and E. 26th Streets.

Program Overview

The program includes the study of basic material properties and structure of a full range of biomaterials used in medicine and dentistry. The biologic interactions of these materials related to their composition, surface, architectural features and function; and the methods employed to investigate structure, function, and biologic interactions are presented and explored.

Three degree options are available to students depending on their future intentions and requirements:

- One-year non-thesis option (p. 1)
- Two-year thesis option (p. 1)
- Two-year non-thesis option (p. 1)

Admissions

See Master's Degree Programs (https://dental.nyu.edu/education/ masters-degree-programs.html) for admission requirements and instructions specific to this program.

Program Requirements

One-Year Program

The completion of 30 credits is required for the one-year MS in Biomaterials program. Of the 30 credits required, 26 credits <u>must</u> be from the Department of Biomaterials at New York University or from courses taught in conjunction with the department.

Course	Title	Credits		
Required Courses				
BIOMS-DN 1000	Principles of Biomaterials Science	3		
BIOMS-DN 1001	Metal and Ceramic Biomaterials	3		
BIOMS-DN 1002	Polymers & Biopolymers	3		
BIOMS-DN 1005	Biomaterials Tissue Interface I	3		
BIOMS-DN 1006	Biomaterials Tissue Interface II	3		
BIOMS-DN 1012	Biostatistics I	3		
BIOMS-DN 2001	Intro to Research	2		
BIOMS-DN 3001	Independent Project in Biomaterial	2		
Sample Electives*				
BIOMS-DN 1016	Imaging Science	4		
BIOMS-DN 3000	Research in Biomaterials (taken for 1 credit)	1		
BIOMS-DN 3003	Integrative Seminars in Oral Biology I	3		
BIOMS-DN 3012	Seminars in Advanced Dental Biomaterials	3		

*Additional Elective courses may be available through alternative departments outside of the Division of Biomaterials.

Two-Year Program

Students can complete the two-year program via the Thesis or Non-Thesis track.

The completion of 36 credits is required for the two-year MS in Biomaterials program. Of the 36 credits required, 28 credits <u>must</u> be from the Department of Biomaterials at New York University or from courses taught in conjunction with the department.

Course	Title	Credits		
Required Courses				
BIOMS-DN 1000	Principles of Biomaterials Science	3		
BIOMS-DN 1001	Metal and Ceramic Biomaterials	3		
BIOMS-DN 1002	Polymers & Biopolymers	3		
BIOMS-DN 1005	Biomaterials Tissue Interface I	3		
BIOMS-DN 1006	Biomaterials Tissue Interface II	3		
BIOMS-DN 1012	Biostatistics I	3		
BIOMS-DN 2001	Intro to Research	2		
BIOMS-DN 3001	Independent Project in Biomaterial	2		
Sample Electives*				
BIOMS-DN 1008	Intro to Electron Microscopy	3		
BIOMS-DN 1017	Complex Materials Systems and Biosensors	3		
BIOMS-DN 3000	Research in Biomaterials	5		
BIOMS-DN 3012	Seminars in Advanced Dental Biomaterials	3		

*Additional Elective courses may be available through alternative departments outside of the Division of Biomaterials.

Additional Program Information

Research

Students enrolled in the two-year thesis track will be required to complete a 2-6 credit research project. Students in the one-year or two-year nonthesis track, will not participate in a research project, but instead will complete a 2-credit independent project. In all cases, students will select a faculty mentor and, under guidance, propose and develop a topic for exploration.

Lab Safety Training is required for all students in the thesis-track degree program prior to starting any activity in the department laboratories.

Thesis Track Timeline

This time frame is based on a two-year completion plan for full time students for the thesis-based Master's Degree. It is anticipated that the student will complete most of the course requirements in the first academic year and the research requirements in the second year.

- 1. First Semester. Begin coursework. Begin selection process for thesis research project as well as mentor and committee selection.
- 2. Second Semester. At this time the mentor and committee should be selected and a preliminary proposal should be prepared. By mid semester these steps should be complete. By the end of this semester the student should have submitted their first draft of a thesis proposal.
- 3. Third Semester. By the beginning of the third semester of graduate study, the student should have an approved thesis proposal or independent project and be starting their writing. The student should also begin writing the final dissertation. The bulk of the thesis work and data acquisition should be conducted during this semester.
- 4. Fourth Semester: Work in the fourth semester should revolve around completion of thesis research, writing of the final dissertation, and completion of the Master's Degree Checklist. By the middle of this semester, arrangements should be made for submission of the final dissertation and arrangement of the thesis defense date. By the end of the semester, all thesis requirements should be complete.

Special Program Emphasis

Only available for students completing the 2-year option.

Special Program Emphasis may be arranged by the Department Chair or program director for students desiring to participate in a Special Emphasis research study (e.g., concentration in another department of the University, but still related to Biomaterials and Biomimetics (physics, chemistry, biology, etc.). Students working with a Special Program Emphasis may, in consultation with the Director of Graduate Studies, be required to take courses in addition to the 36 credits mentioned above.

Departmental Meetings and Seminars

Mandatory attendance is required of all graduate students to periodic departmental seminars and/or research group meetings and various sessions of Laboratory Safety (see section "Requirements for Participation in Research"). At these seminars and research group meetings, students, faculty and scholars from other institutions discuss their research plans and findings. In addition, the department may cosponsor special seminars throughout the year for which attendance is also mandatory unless specifically excused by the Director of Graduate Studies.

Meetings with Program Administrator

All students are required to schedule regular meetings with the Program Administrator in order to keep current regarding course requirements, regulatory status, research requirements, research progress, thesis defense preparations, and if applicable, visa status.

Sample Plan of Study One-Year Plan

Course	Title	Credits
1st Semester/Term		
BIOMS-DN 2001	Intro to Research	2
BIOMS-DN 1000	Principles of Biomaterials Science	3
BIOMS-DN 1005	Biomaterials Tissue Interface I	3
BIOMS-DN 1016	Imaging Science	4
BIOMS-DN 1012	Biostatistics I	3
	Credits	15
2nd Semester/Term		
BIOMS-DN 1006	Biomaterials Tissue Interface II	3
BIOMS-DN 1001	Metal and Ceramic Biomaterials	3
BIOMS-DN 1002	Polymers & Biopolymers	3
BIOMS-DN 3012	Seminars in Advanced Dental Biomaterials	3
BIOMS-DN 3000	Research in Biomaterials	1
BIOMS-DN 3001	Independent Project in Biomaterial	2
	Credits	15
	Total Credits	30

Two-Year Plan

Course	Title	Credits
1st Semester/Term		
BIOMS-DN 1000	Principles of Biomaterials Science	3
BIOMS-DN 1005	Biomaterials Tissue Interface I	3
BIOMS-DN 1008	Intro to Electron Microscopy	3
BIOMS-DN 2001	Intro to Research	2
	Credits	11
2nd Semester/Term		
BIOMS-DN 1001	Metal and Ceramic Biomaterials	3
BIOMS-DN 1002	Polymers & Biopolymers	3
BIOMS-DN 1006	Biomaterials Tissue Interface II	3
	Credits	9
3rd Semester/Term		
BIOMS-DN 1012	Biostatistics I	3
BIOMS-DN 1017	Complex Materials Systems and Biosensors	3
BIOMS-DN 3000	Research in Biomaterials	3
	Credits	9
4th Semester/Term		
BIOMS-DN 3000	Research in Biomaterials	2
BIOMS-DN 3001	Independent Project in Biomaterial	2
BIOMS-DN 3012	Seminars in Advanced Dental Biomaterials	3
	Credits	7
	Total Credits	36

Learning Outcomes

Students who have completed the Master's in Biomaterials Science Program will be well prepared to apply their state-of-the-art biomaterials knowledge in careers in dentistry, medicine, the medical device industry, or in biomaterials research.

1. Graduates just entering dental school will be able to utilize their biomaterials knowledge in their dental education.

- 2. Graduates who are already dental faculty will be able to conduct research and teach dental biomaterials at their universities.
- 3. Graduates will be able to enter the medical device industry and apply their knowledge in the design and fabrication of medical devices.
- 4. Graduates with plans to continue their educations will be able to use this program as a step toward a PhD or other degrees in medicine or engineering.

Policies NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

College of Dentistry Policies

A full list of related academic policies can be found on the College of Dentistry Academic Policies page (https://bulletins.nyu.edu/graduate/ dentistry/academic-policies/).