**M.S. MOLECULAR BIOSCIENCES**

The MS in Molecular Biosciences is a 33 credit, 24-month degree program designed to educate students in the basic mechanisms of human health and disease. The program is interdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with foundational didactic coursework and the opportunity to explore basic and clinically relevant scientific questions in the laboratory (Thesis track) or an industrial setting through experiential learning (Capstone track). The program encompasses a broad range of disciplines, including molecular genetics, cell biology, microbiology, immunology, and infectious diseases. The program offers courses in the core biomedical disciplines, laboratory research techniques, ethical conduct of science, and a graduate seminar course.

The program has two tracks: Thesis track and Capstone track. The Thesis track emphasizes the importance of high quality research and is designed to assist students in fulfilling their potential as research scientists. It requires the completion of original research and publication of a thesis describing that research. The Capstone Track provides students with co-operative experiential learning opportunities (Co-op) in biopharmaceutical industry, federal or state public health labs, or clinical research laboratories to gain skills and knowledge required for seeking employment in these sectors. The Capstone course serves as a culminating part of this track and requires the production of a written document based on 1) literature review on an existing scientific topic or 2) a no-credit experiential learning experience such as a co-op, internship, or basic/clinical lab research.

The graduates from this program can have careers that involve research by government agencies, research centers, non-profit organizations, industry, colleges and universities. It also prepares students for advanced degrees in the microbiology, immunology, molecular and cell biology, and medicine.

Upon successful completion of the program, students will:

* Obtain broad knowledge through courses, laboratory, and the scientific literature in the field of molecular biosciences
* Demonstrate skills to conduct independent original research in a specialized area of molecular biosciences or work on real-world problems in the biopharmaceutical industry
* Demonstrate the ability to organize and effectively communicate oral and written scientific information
* Develop the skills to be competitive for jobs in academia and industry
* Develop the skills to be competitive for graduate or professional programs

**M.S. MOLECULAR BIOSCIENCES REQUIRED COURSES**

**Core Requirements: 12 required credits**

BIO 625: Advanced Molecular Biology (3)

BIO 630: Advanced Cell Biology (3)

MAT 610: Statistical Inference and Modeling (3)

ETH 610: Ethics in Research (1)

BIO 650: Research Design (2)

**Thesis Track:**

BIO 670: Research Rotation (2)

BIO 701/702: Thesis Research (6)

BIO 660: Journal Club (1)

Electives (12)

**Capstone Track:**

BIO 665: Molecular Biosciences Capstone (4)

BIO 660: Journal Club (2)

Electives (15)

**Total Credits: 33**

**M.S. MOLECULAR BIOSCIENCES ELECTIVE COURSES**

Students wanting to specialize in any of the areas listed below should take electives within the color coded group.

Red- Biomedical Microbiology;

Blue- Biochemistry, Cancer Biology, Molecular & Cell Biology;

Green- Clinical Microbiology

Pink- Epidemiology, Public Health Microbiology, Courses at SUNY Albany with permission of PD

Brown- Industrial Microbiology

|  |  |  |
| --- | --- | --- |
| **GRADUATE ELECTIVES** | | |
| **Code** | **Course Name** | **Credits** |
| BIO 620 | Advanced Topics in Microbiology | 3 |
| BIO 627 | Innate Immunology | 3 |
| BIO 610 | Immunology | 3 |
| BIO 690 | Viral Pathogenesis | 3 |
| BIO 680 | Bacterial Pathogenesis | 3 |
| BIO 635 | Cell Death and Disease | 3 |
| PSC 635 | Pharmacological Regulation of Signal Transduction | 3 |
| PSC 733 | Pharmacology and Molecular Genetics of Cancer | 3 |
| PSC 625 | Clinical Biochemistry | 3 |
| CLS 610 | Clinical Microbiology I | 4 |
| CLS 620 | Clinical Microbiology II | 4 |
| BHS 740 | Genetics and Molecular Basis of Disease | 3 |
| BHS 745 | Molecular Diagnostics | 3 |
| BHS 750 | Flow Cytometry | 3 |
| BIO 615 | Public Health Microbiology | 3 |
| PAD 693 | Epidemiology | 3 |
| BIO 648 | Microbial Fermentation | 3 |
| BIO 631 | Mammalian Cell Culture | 3 |
| BIO 655 | Pharmaceutical Microbiology | 3 |
| BIO 641 | Current Topics in Biopharmaceutical Technology | 3 |
| PSC 620 | Downstream Processing of Biopharmaceutical Products | 3 |
| PSC646G | Regulatory Science | 3 |
| PSC652 | Using animal models for therapeutic drug discovery | 3 |
| PSC625 | Clinical Biochemistry | 3 |

1. **M.S. MOLECULAR BIOSCIENCES THESIS TRACK SAMPLE SCHEDULE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **YEAR 1 FALL** | | | | **YEAR 1 SPRING** | | |
| **Code** | **Name** | **Credits** |  | **Code** | **Name** | **Credits** |
| BIO 625 | Advanced Molecular Biology | 3 |  | BIO630 | Advanced Cell Biology | 3 |
| ETH 610 | Ethics in Research | 1 |  | BIO 650 | Research Design | 2 |
| MAT 610 | Statistical Inference and Modeling | 3 |  | BIO 660 | Journal Club | 1 |
| BIO 670 | Research Rotation | 2 |  |  | Elective 1 | 3 |
|  |  |  |  |  | Elective 2 | 3 |
| **Total Credits** | | **9** |  | **Total Credits** | | **12** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **YEAR 1 FALL** | | | | **YEAR 1 SPRING** | | |
| **Code** | **Name** | **Credits** |  | **Code** | **Name** | **Credits** |
|  | Elective 3 | 3 |  |  | Elective 4 | 3 |
| BIO 701 | Thesis Research | 3 |  | BIO 702 | Thesis Research | 3 |
| **Total Credits** | | **6** |  | **Total Credits** | | **6** |

\*Requires completing Thesis Research after Years 1& 2.

\*\*All students will register for BIO 380 Microbiology Seminar (0 credits) every semester.

#All Master’s students are encouraged to attend Journal club every semester.

1. **M.S. MOLECULAR BIOSCIENCES CAPSTONE TRACK SAMPLE SCHEDULE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **YEAR 1 FALL** | | | | **YEAR 1 SPRING** | | |
| **Code** | **Name** | **Credits** |  | **Code** | **Name** | **Credits** |
| BIO 625 | Advanced Molecular Biology | 3 |  | BIO 650 | Research Design | 2 |
| ETH 610 | Ethics in Research | 1 |  | BIO 630 | Advanced Cell Biology | 3 |
| MAT 610 | Statistical Inference and Modeling | 3 |  |  | Elective 2 | 3 |
| BIO 660 | Journal Club (G-1) | 1 |  |  | Elective 3 | 3 |
|  | Elective 1 | 3 |  |  |  |  |
| **Total Credits** | | **11** |  | **Total Credits** | | **11** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **YEAR 2 FALL** | | | | **YEAR 2 SPRING** | | |
| **Code** | **Name** | **Credits** |  | **Code** | **Name** | **Credits** |
|  | Elective 4 | 3 |  |  | Experiential Learning | 0 |
|  | Elective 5 | 3 |  | BIO 665 | Molecular Biosciences Capstone Course\* | 4 |
| BIO 660 | Journal Club (G-2) | 1 |  |  |  |  |
| **Total Credits** | | **7** |  | **Total Credits** | | **4** |

\*May require completing Capstone Course after Years 1 & 2.

\*\*All students will register for BIO 380 Microbiology Seminar (0 credits) every semester.

#All Master’s students are encouraged to attend Journal club every semester.