# BIOINFORMATICS - MASTER OF SCIENCE

The Master of Bioinformatics degree has two tracks, a track for students without a BS/BA in computer science or equivalent degree (Track: *Non-Computing Background*) and a track for students with a BS/BA in computer science or equivalent degree (Track: *Computer Science Background*). In each of the track, two options are available, one with **thesis or project** option and a **course-work only** option.

- For **Thesis/Project option's students**: the requirements are listed in the tables below.
- For **Course-Work Only option's students:** Each student following this option is not required to complete a Thesis/Project but needs to take, in addition to the basic requirement (Core + Elective courses), **9 credits** of graduate courses that are listed for each track with the following restrictions:
  - One course can only be used to satisfy one requirement (e.g., if a course used to satisfy the core requirement category, it cannot be counted towards satisfying the requirements on **9 credits**).
  - At most 6 credits of CSCI 5996 Special Topics with different topics (i.e., with different subtitles) can be counted towards the degree program of the student.
  - No independent research or thesis/project (e.g., Computer Science course numbered > 5888) can be counted towards the degree program.

## Track: Non-Computing Background

| Prefix | Title | Credits |
|---|---|---|
| **Required Courses** | | |
| *Core Courses* | | |
| BIOL 550 | Special Topics (Command Line Genomics) | 3 |
| A ST 505 | Statistical Inference I | 4 |
| CSCI 4520 | Python Programming I | 3 |
| BIOL 550 | Special Topics (R for ecological sciences) | 3 |
| or CSCI 4530 | R Programming I | |
| CSCI 5310 | Bioinformatics Programming | 3 |
| **Select one of the following** | | **3** |
| CSCI 5415 | Introduction to Data Mining | |
| CSCI 5420 | Applied Machine Learning I | |
| CSCI 5860 | Algorithms in Systems Biology | |
| *Elective Courses (2 from the following list)* | | *6* |
| CSCI 4545 | Object Oriented Programming Transition | |
| CSCI 5305 | Bioinformatics | |
| CSCI 5860 | Algorithms in Systems Biology | |
| GENE 452 | Applied Bioinformatics | |
| or BIOL 566 | Advanced Bioinformatics and NCBI Database | |
| A ST 550 | Special Topics (Statistical bioinformatics course) | |
| A ST 550 | Special Topics (Current topics in bioinformatics - open issues) | |
| *Master's Project/Thesis/Internship* [1] | | *6* |
| CSCI 5994 | Master's Project | |
| or CSCI 5999 | Master's Thesis | |
| **Total Credits** | | **31** |

[1] A student can write a thesis (CSCI 5999 Master's Thesis), undertake a research project (CSCI 5994 Master's Project, or participate in an internship related to the degree. In each case, six graduate credits are required and a written approval from the student's advisor must be obtained before the student undertakes this part of the study. For students with thesis or project, the students are required to sustain a final exam, covering the thesis/research project.

## Track: Computer Science Background

| Prefix | Title | Credits |
|---|---|---|
| **Required Courses** [2] | | |
| CSCI 5415 | Introduction to Data Mining | 3 |
| CSCI 5310 | Bioinformatics Programming | 3 |
| CSCI 5505 | Analysis of Algorithms | 3 |
| CSCI 5860 | Algorithms in Systems Biology | 3 |
| CSCI 5810 | Advanced Software Engineering | 3 |
| Select one from the following: | | 3 |
| CSCI 5305 | Bioinformatics | |
| GENE 452 | Applied Bioinformatics | |
| BIOL 566 | Advanced Bioinformatics and NCBI Database | |
| *Elective Courses (2 from the following list)* | | *6* |
| A ST 505 | Statistical Inference I | |
| A ST 506 | Statistical Inference II | |
| BCHE 546 | Biochemistry II: Central and Intermediary Metabolism | |
| BCHE 649 | Topics in Biochemistry | |
| BIOL 474 | Immunology | |
| BIOL 475 | Virology | |
| BIOL 478 | Molecular Biology of Microorganisms | |
| BIOL 490 | Neurobiology | |
| BIOL 520 | Molecular Cell Biology | |
| BIOL 566 | Advanced Bioinformatics and NCBI Database | |
| CSCI 5140 | Database Management Systems I | |
| CSCI 5405 | Artificial Intelligence I | |
| CSCI 5305 | Bioinformatics | |
| CSCI 5215 | Parallel Programming | |
| CSCI 5750 | Artificial Intelligence II | |
| CSCI 5820 | Database Management Systems II | |
| GENE 452 | Applied Bioinformatics | |
| GENE 486 | Genes and Genomes | |
| MOLB 542 | Biochemistry I | |
| MOLB 546 | Biochemistry II | |
| MOLB 590 | Discussions in Molecular Biology | |
| *Master Thesis/Project/Internship* [1] | | *6* |
| CSCI 5999 | Master's Thesis | |
| or CSCI 5994 | Master's Project | |
| **Total Credits** | | |
| **Total Credits** | | **30** |

[1] A student can write a thesis (CSCI 5999 Master's Thesis), undertake a research project (CSCI 5994 Master's Project), or participate in an internship related to the degree. In each case, six graduate credits are required and a written approval from the student's advisor must be obtained before the student undertakes this part of the study. For

students with thesis or project, the students are required to sustain a final exam, covering the thesis/research project.