



## Computational Science and Engineering Certification for Molecular and Cellular Biology (MCB)

The Computational Science and Engineering certificate program provides MCB undergraduate students an opportunity to develop a solid foundation in the use of computational tools and techniques for addressing problems in molecular and cellular biology.

This CSE Certificate option is only available to students currently enrolled in the Molecular & Cellular Biology (MCB) undergraduate degree program at the University of Illinois Urbana-Champaign. Many of the certificate requirements also count toward the MCB degree requirements. To receive a certificate in “Computational Science and Engineering”, students must **complete coursework in all 4 categories below, totaling at least 12 hours.**

### REQUIRED COURSEWORK:

Topic	Course Number	Hours
Programming core	IB 493 or CS 101 or CS 125	2-4
Biostatistics core	STAT 212	3
Bioinformatics core	MCB 432 or CS 466	3
Core /Application Coursework or research credit	MCB 419, <sup>a</sup> MCB 435/493 sxn CSE, IB 494, or <sup>b</sup> MCB 290 (with approval) or any 400-level CSE course listed in: <a href="http://cse.illinois.edu/courses">http://cse.illinois.edu/courses</a>	2-4
<b>TOTAL</b>		<b>12</b>

<sup>a</sup> MCB 435 counts toward the certificate only if a special companion section of MCB 493 sxn CSE is taken concurrently. Consult the instructor for details.

<sup>b</sup> MCB 290 (Undergraduate Research) may be used to fulfill an application course. Engaging in undergraduate research helps hone both personal and professional growth and advancement by developing research skills and experiences that are in demand by both graduate schools and employers. The undergraduate research project must apply computational tools and techniques to MCB-related research problems. The research project may also include laboratory research, but it must include a significant computational component. Additionally, in order for MCB 290 to fulfill the certification requirement, the **proposed research must be approved by the CSE steering committee representative of the MCB department<sup>\*\*\*</sup>** or by one of the CSE affiliated MCB faculty listed on the Computational Science and Engineering website: <http://cse.illinois.edu/directory/faculty-affiliates>.

<sup>\*\*\*</sup> List of Steering Committee Representatives: <http://cse.illinois.edu/directory/administration>

# Course Information

**1) Programming core** (ONE of the following courses)

IB 493 Programming for Genomics (2 hours)

CS 101 Intro to Computing for Engineers and Scientists (3 hours)

CS 125 Intro to Computer Science (4 hours)

**2) Biostatistics core** (ONE of the following courses)

STAT 212 Biostatistics (3 hours)

**3) Bioinformatics core** (ONE of the following courses)

MCB 432 Computing in Molecular Biology (3 hours)

CS 466 Introduction to Bioinformatics (3 hours)

**4) Applications** (at least 3 hours from ANY of the following)

MCB 419 Brain Behavior & Information Processing (3 hours)

MCB 435 Evolution of Infectious Disease + MCB 493 sxn CSE (3 + 1 hours)

(must enroll in both MCB 435 and section CSE of MCB 493)

IB 494 Theoretical Biology & Models (4 hours)

MCB 290 Undergraduate Research: the project must apply computational tools and techniques to MCB-related research problems and be approved by the MCB/CSE representative)

## Sample schedule

- Programming – CS 101 in Fresh/Soph years or IB 493 in Junior year
- Biostatistics – STAT 212 in Fresh/Soph years
- Bioinformatics – MCB 432 or CS 466 in Junior/Senior years
- Applications course or MCB 290 credit – Junior/Senior years

**Note:** Students are not guaranteed a seat in a course required by the certificate, but are welcome to enroll in courses where seats remain available after any restriction, which may have been placed, has been removed.