

# Biotechnology (11BIM)

## Description

The undergraduate Minor in Biotechnology is a university-wide program and draws upon NC State's strength in the life sciences, agriculture and engineering. Students in the minor will participate in a series of cutting-edge laboratory-intensive courses. Upon completion of the minor, students will have a conceptual understanding of a wide array of research applications in biotechnology, as well as mastery of numerous techniques.

Biotechnology is not universally accepted, and one role of a university is to ensure that this technology is used wisely. A key part of the training provided by the Biotechnology Minor is the requirement for an ethics course that promotes critical thinking of ethical issues and discussions of individual and collective rights and responsibilities. By active participation in break-out sessions, each student can contribute their concerns and thoughts regarding the complex issues that accompany use of genetically engineered organisms.

## Requirements

The requirements for the Biotechnology Minor include 8-11 credits of biotechnology-related laboratory courses (see Group B and C), and a 1-3 credit biotechnology ethics course (Group E). A 3 credit research experience related to biotechnology (Group D) is strongly recommended but may be replaced with an additional 2 credit biotechnology-related laboratory course (Group C) and a 1 credit biotechnology professional development course (Group D), Group A describes the pre-requisite courses a student will need to have completed satisfactorily in order to be eligible to start the minor. The minor requires 19-22 credit hours depending on course selection.

## Required Courses

### Group A: Preparatory Classes

Choose one from this group:

- BIO 183 Introduction to Biology I: Cellular and Molecular Biology (4 cr)

And the following course is required after one of the above has been completed:

- CH 223 Organic Chemistry II (3 cr)

Group B (4 credits): One of these courses should be taken preferably during the junior or senior year, prior to or concurrently with the research internship in Group D. BIT 410 is the preferred course for students to take and will be offered in fall, spring, and most summer semesters.

- BIT 410 Manipulation of Recombinant DNA (4 cr)

The following course may be substituted for BIT 410:

- BCH 454 Advanced Biochemistry Lab (4 cr)

Group C (4-5 credit hours): These courses will be offered in pairs of 7.5-week modules during the Fall and Spring semesters, or as 2 week modules during the summer. You may combine any two courses from this list. BIT special topic laboratory courses designated BIT495 or BIT595 may be used with departmental approval.

Other BIT 500-level laboratory courses are permitted with departmental approval. BIT laboratory courses are constantly added and updated to cover new biotechnology techniques. To view the latest BIT special topics laboratory course visit the BIT program website <http://biotech.ncsu.edu/courses>

The following course may be substituted for one module:

- MB 451 Microbial Diversity (3 cr)

Group D (3 credit hours): A 3 credit research experience related to biotechnology is strongly recommended. This should be done through your major department if possible. Most majors have 492/493/level courses that give credit for research experience. An additional 2 credit biotechnology-related laboratory course (Group C) plus a 1 credit biotechnology professional development course (BIT 495) may replace this research requirement.

There are many opportunities for summer internships in the Research Triangle Park. Please consult with your advisor, the [coordinator of advising](#) for your major or Marcy Bullock ([Marcy\\_Bullock@ncsu.edu](mailto:Marcy_Bullock@ncsu.edu)) or Tricia Buddin ([Tricia\\_Buddin@ncsu.edu](mailto:Tricia_Buddin@ncsu.edu)) in the College of Agricultural and Life Sciences [Career Services office](#) at 515-3249 or the BIT advisor Dr. Sabrina Robertson ([sedought@ncsu.edu](mailto:sedought@ncsu.edu))

Existing courses that fulfill this requirement include:

- ALS 499 Honors Research (3 cr)
- CHE 497 Undergraduate Research (3 cr)
- Any 492 or 493 course in a Science Department, providing that a biotechnology-related research topic is pursued (3 cr)

Group E (1-3 credits): You must enroll for 1-3 credits of courses that include ethical discussions of biotechnology.

Any of the following courses will fulfill this requirement. Other courses may be used with departmental approval.

- IDS 201 Environmental Ethics (3cr)
- STS 302 Contemporary Science, Technology and Human Values (3cr)
- IDS 303 Humans and the Environment (3cr)
- STS 304 Ethical Dimensions of Progress (3cr)
- PHI/STS 325 Bio-Medical Ethics(3cr)
- BIT 501 Ethical Issues in Biotechnology (1 cr)

## Elective Courses

None

## Admissions and Certification of Minor

Students who have questions or who would like to be admitted to the minor should complete the University Minor Declaration Form. The minor must be completed no later than the semester in which the student expects to graduate from his or her degree program. The [University Minor Declaration Form](#) (pdf) is the paperwork necessary for certification and should be completed during the registration period that will complete the requirements for the minor or during the registration period for the student's final semester at NC State.

## Contact Persons

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