Biotechnology (Minor)

To see what you will learn while pursuing this program, visit the Learning Outcomes website (https://apps.oirp.ncsu.edu/pgas/)!

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 the use of genetically engineered organisms.

Admissions and Certification of Minor

Students who have questions or who would like to be admitted to the minor should complete the Change of Degree Application (CODA) to Add a Minor (https://studentservices.ncsu.edu/your-degree/coda-home/add-a-minor/). The minor must be completed no later than the semester in which the student expects to graduate from their degree program. The CODA 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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Plan 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.

Code	Title	Hours	Counts towards
Group A: Preparatory Classes			
BIO 183	Introductory Biology: Cellular and Molecular Biology	4	
CH 223	Organic Chemistry II [1]	3	
Group B			
BIT 410	Manipulation of Recombinant DNA [2]	4	
or BCH 454	Advanced Biochemistry Laboratory		
Group C			
Biotechnology Techniques Module Pairs [3]		4-5	
Group D			
Select one of the following: [4]		3	
ALS 499	Honors Research or Teaching II		
CHE 497	Chemical Engineering Projects I		
Any 492 or 493 course in a Science Department, providing that a biotechnology-related research topic is pursued			
Group E			
Any of these courses will fulfill this requirement. Other courses may be used with departmental approval. [5]		1-3	
IDS 201	Environmental Ethics		
STS 302	Contemporary Science, Technology and Human Values		
IDS 303	Humans and the Environment		
STS 304	Ethical Dimensions of Progress		
PHI/STS 325	Bio-Medical Ethics		
BIT 501	Ethical Issues in Biotechnology		
Total Hours		**19-22**	

1. This course is required after the above course has been completed.
2. 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 Manipulation of Recombinant DNA is the preferred course for students to take and will be offered in fall, spring, and most summer semesters.

[3] 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 BIT 495 Special Topics in Biotechnology or BIT 595 Special Topics 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 (http://biotech.ncsu.edu/courses/)

[4] 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 Special Topics in Biotechnology) 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 (http://www.ncsu.edu/advising_central/advisers.html) for your major or Marcy Bullock (Marcy_Bullock@ncsu.edu) or Tricia Buddin (Tricia_Buddin@ncsu.edu) in the College of Agricultural and Life Sciences Career Services office (http://www.cals.ncsu.edu/career/) at 515-3249 or the BIT advisor Dr. Sabrina Robertson (sedought@ncsu.edu)

[5] You must enroll for 1-3 credits of courses that include ethical discussions of biotechnology.