Biotechnology, A.S.

The greater Kansas City area and specifically Johnson County have numerous biological-, pharmaceutical- and chemical-related formulating, manufacturing, research and testing companies. Many of these facilities employ scientific technicians to support the endeavors of their professional scientists and engineers.

JCCC's science technology program is designed to develop scientific support personnel for the metropolitan area.

This program offers specific knowledge and training designed to provide you with entry-level skills for employment as a technician. It also provides the breadth of background sufficient to encourage change and flexibility.

The biotechnology associate of science degree program will prepare students who wish to pursue a baccalaureate degree in the biological sciences. Upon completion of this 76-hour degree, students will be able to find entry-level or higher positions in the diverse field of biotechnology. Along with basic and more advanced science courses, students will take specialized courses in subjects such as laboratory safety and biotechnology methods.

Note: Metropolitan Community College students should seek specific counsel from the JCCC program personnel for the appropriate course plan and numbers.

Metropolitan Community College students should refer to Cooperative Program Information (http://www.jccc.edu/cooperative).

IMPORTANT - Students planning to graduate with a Biotechnology degree must complete one of the approved cultural diversity courses. Some of the approved courses are able to meet both the cultural diversity requirement and a general education requirement. To see a complete list of approved courses, click on the link provided below.

Cultural Diversity Course Requirement at JCCC (http://catalog.jccc.edu/spring/degreecertificates/electives/cultural-diversity-courses-aa)

(Major Code 2130; State CIP Code 41.0101)

- Science (http://www.jccc.edu/science)

Associate of Science Degree

First Semester

MATH 181	Statistics*	3
BIOL 135	Principles of Cell and Molecular Biology	4
CHEM 124	General Chemistry I Lecture*	4
CHEM 125	General Chemistry I Lab	1
Students who withdraw from GENERAL CHEMISTRY I LECTURE must also withdraw from the corresponding laboratory GENERAL CHEMISTRY I LABORATORY		
Students may not withdraw from the laboratory course GENERAL CHEMISTRY I LABORATORY without withdrawing from CHEMISTRY I LECTURE.		
SPD 121	Public Speaking	3
ENGL 121	Composition I*	3
Total Hours		18

Second Semester

BIOT 160	Introduction to Biotechnology*	2
BIOL 150	Biology of Organisms*	5
CHEM 131	General Chemistry II Lecture*	4
CHEM 132	General Chemistry II Lab*	1
Students who withdraw from GENERAL CHEMISTRY II LECTURE must also withdraw from the corresponding laboratory GENERAL CHEMISTRY II LABORATORY.		
Students may not withdraw from the laboratory course GENERAL CHEMISTRY II LABORATORY without withdrawing from CHEMISTRY II LECTURE.		
ENGL 123	Technical Writing I*	3
HIST 125	Western Civilization: Readings and Discussion I	3
Total Hours		18

Summer

BIOT 165	Laboratory Safety*	1
Social Science/Economics Elective ^		3
Total Hours		4

^ Social Science/Economics Elective (http://catalog.jccc.edu/spring/degreecertificates/electives/social-sci-econ-as)

Third Semester

BIOT 230	Microbiology for Biotechnology*	5
BIOL 205	General Genetics*	4
PHYS 130	College Physics I*	5
Social Science/Economics Elective ^		3
Physical Education Elective ^^		1
Total Hours		18

^ Social Science/Economics Elective (http://catalog.jccc.edu/spring/degreecertificates/electives/social-sci-econ-as)

^^ Physical Education Elective (http://catalog.jccc.edu/spring/degreecertificates/electives/health-and-or-physical-ed-as)

Fourth Semester

BIOT 260	Biotechnology Methods*	5
CHEM 220	Organic Chemistry I*	5
PHYS 131	College Physics II*	5
Humanities Elective ^		3
Total Hours		18

^ Humanities Elective (http://catalog.jccc.edu/spring/degreecertificates/electives/humanities-as)

Total Program Hours: 76

Optional Course

BIOT 265	Biotechnology Internship*	4
Total Hours		4

With the OPTIONAL course: Total Program Hours: 80

Courses

BIOT 160 Introduction to Biotechnology* (2 Hours)
Prerequisites: (CHEM 122 or CHEM 124 and CHEM 125) and Prerequisite or corequisite BIOL 135 *All prerequisites and corequisites require a grade of "C" or higher

This course is an introduction to biotechnology, including career exploration, history and applications of DNA/RNA technology, molecular biology, and bioethics. Topics include cloning, DNA, antibodies, gene therapy, plant biotechnology, the human genome project, DNA fingerprinting, genetic testing, diverse products made through biotechnology, and the ethical implications of this technology. The course is intended for those interested in pursuing a career in an industrial, academic, or biomedical research laboratory. 2 hrs. lecture/wk.

BIOT 165 Laboratory Safety* (1 Hour)
Prerequisites: (CHEM 122 or CHEM 124 and CHEM 125) and Prerequisite or corequisite BIOL 135 *All prerequisites and corequisites require a grade of "C" or higher

This course will emphasize laboratory safety and procedures. Additionally, regulations that govern the biotechnology laboratory will be discussed. Biological, chemical and radiation safety will all be handled through lectures, videotapes, demonstrations and field trips. There will also be exposure to good manufacturing practices (GMP), quality assurance and control procedures (QA/QC), and OSHA and FDA regulations. 1 hr. lecture/wk.

BIOT 230 Microbiology for Biotechnology* (5 Hours)
Prerequisites: BIOL 135 and BIOT 160 and BIOT 165 All prerequisites require a grade of "C" or higher

This is an introductory course in microbiology for biotechnology students. It provides a background in many areas of microbiology with an emphasis on molecular aspects and applications for biotechnology. Industrial and food microbiology will also be examined. The structure, physiology, antimicrobial agents, immunology and host-parasite relationship of microorganisms will also be studied, with an emphasis on bacteria. Students will learn aseptic techniques and apply them in the isolation, growth and maintenance of pure cultures of bacteria. Students will also perform various molecular and genetic techniques as well as chemical tests to identify these bacteria. The growth phases of bacteria and response of bacteria to changes in environmental conditions will be examined. 3 hrs lecture, 4 hrs lab /wk.

BIOT 260 Biotechnology Methods* (5 Hours)
Prerequisites: BIOT 160 and BIOT 165

Prerequisites or corequisites: BIOT 230 *All prerequisites and/or corequisites require a grade of "C" or higher

This course is an introduction to the theory and laboratory techniques in molecular biology, protein biochemistry and immunology with an emphasis on gene expression and regulation, recombinant DNA, RNA transcription, and protein translation. Laboratory emphasis will be on molecular biological techniques utilized in modern research and industrial laboratories. Techniques include growth and maintenance of E. coli, gene cloning, DNA and protein electrophoresis protein purification and enzymatic and immunology assays. Lecture and laboratory exercises on the principles and practices of initiation, cultivation, maintenance, preservation of cell culture lines and applications will also be covered. 3 hrs lecture, 6 hrs. lab/wk.

BIOT 265 Biotechnology Internship* (4 Hours)
Prerequisites: BIOT 260 and BIOT 160 and BIOT 165 and department approval

The internship will provide advanced students the opportunity to develop job and career-related skills while in a work setting. Upon successful completion of this course, the student should be able to apply classroom knowledge to an actual work situation. The work will be developed cooperatively with academic, industrial and private institutional biotechnology laboratories. 20 hrs./wk.