

Lakeland

COMMUNITY COLLEGE

PROGRAM GUIDE

Applied Studies Division

Biotechnology Science

- Associate of Applied Science Degree in Biotechnology Science
- Biotechnology Science Certificate
- Bioinformatics Concentration

★ Opportunity
starts **HERE**
lakelandcc.edu



Biotechnology Science



Biotechnology science is the use of organisms, cells or their components to create products or solve problems. A degree in biotechnology science easily transfers to a bachelor's degree in a biotechnology-related field.

Biotechnology science has applications in the fields of medicine, environmental science, food science, agriculture, textiles and forensics. It is used to study causes and cures for diseases, produce vaccines and gene therapies, create disease resistant plants, strengthen crops, increase the food supply, develop cleaner industrial processes, improve energy efficiency, and protect the environment.

Career Opportunities

There is a high demand for trained employees in the field of biotechnology science. It is one of the top 10 fastest growing fields in the country. Northeast Ohio is home to numerous world-class research institutions and the region has seen an explosion in growth of biotech industries in recent years. Hot career trends include biomedical research, new gene discovery, gene therapy and environmental testing.

Employers aggressively recruit Lakeland graduates to fill the growing demand for qualified bioscience technicians. Many students turn their internships at local academic or industrial organizations into permanent jobs. Recent graduating classes have experienced a greater than 90 percent placement rate in employment, a bachelor's degree program, or both. Seamless articulation agreements and transfer modules with other colleges and universities make the study of biotechnology science at Lakeland an easy first step in a career pathway that can include advanced college degrees.

The Lakeland Advantage

- Easy transfer of biotechnology science credits to bachelor's degree programs.
- The program is partnered with world-class academic institutions including Case Western Reserve University and Cleveland Clinic, as well as private institutions such as STERIS, Athersys, Ricerca Biosciences, Amresco and many others.
- A 2 + 2 bachelor's degree pathway option with Ursuline College.
- Many employers offer tuition waivers and reimbursement programs to reduce, or eliminate, the cost of a bachelor's degree.
- Choose Ohio First Scholarships available to cover a significant portion of Lakeland's tuition.

Lakeland's Program

Lakeland's biotechnology science program offers a two-year course of study leading to an Associate of Applied Science degree in biotechnology science or a biotechnology science certificate for those who already have a bachelor's or associate degree.

A new bioinformatics concentration is a hybrid technical program that combines biotechnology science and information technology/computer science courses.

Students in Lakeland's program gain knowledge and training in a wide range of microbiology and molecular biology laboratory techniques as well as a strong foundation in communication skills.

Classroom and laboratory instruction, plus required internships at leading research or industrial facilities, provide students with the skills to operate the advanced equipment found in most high-tech biomedical, pharmaceutical, agricultural and environmental industries.

Choose  **Ohio** First

**Ten (10) full tuition
scholarships are
available each year.
Contact Dr. Joe Deak at
440.525.7466
for details.**

First Semester:

BIOS 1050	Introduction to Biotechnology Science	3
BIOS 1200	Biotechnology Science Lab Skills	5
BIOL 1510	Principles of Biology I	4
CHEM 1500	General Chemistry I	5
FYEX 1000	First Year Experience	1
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Second Semester:

BIOS 1500	Introduction to Biochemistry	4
BIOL 2700	Microbiology	4
CHEM 1600	General Chemistry II	5
ENGL 1110*	English Composition I (A)	3
OR		
ENGL 1111	English Composition I (B)	
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Summer:

BIOS 1600	Advanced Molecular Separations	4
BIOS 2100	Applied Microbiology	3
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Third Semester:

BIOS 2500	Recombinant DNA Technology	4
BIOS 2600	Bioscience Manufacturing Processes	4
MATH 1550	Statistics	4
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Fourth Semester:

BIOS 2550	Introduction to Bioinformatics	1
BIOS 2800	Biotechnology Science Seminar	1
COMM 1050**	Fundamentals of Public Speaking	2
	Choose course(s) from the Social and Behavioral Science Electives list	3
(1st 8 weeks):		
BIOS 2400	Tissue Culture	3
(2nd 8 weeks):		
BIOS 2700	Internship	3
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Program Total: 66

*English course selection is based on placement test results (ENGL 1111 is 4 credits, only 3 credits apply to the degree). Students who place into ENGL 1111 should consult with the program chair.

**Students may substitute COMM 1000. This 3 credit hour course may be required for students transferring to a four-year college.

Social and Behavioral Sciences Electives: minimum 3 credits

ANTH 1160; ECON 1150, 2500, 2600; GEOG 1500, 1600, 2500; HIST 1150, 1250, 2150, 2250; POLS 1300, 2500; PSYC 1500; SOCY 1150

Biotechnology Science Certificate (3751)

This certificate is designed primarily for students with a baccalaureate or associate degree, and a basic science background including one year of college chemistry, cell biology and general microbiology.

Admission to the Biotechnology Science program is required.

NOTE: BIOS 1500 has prerequisites that include BIOL 1510 Principles of Biology I or an equivalent cellular biology course, and CHEM 1500 General Chemistry I or an equivalent chemistry course. BIOS 2100 has prerequisites that include BIOL 2700 Microbiology or an equivalent general microbiology course. Students may need to take additional courses if they have not already taken the prerequisite courses or their equivalent.

BIOS 1050	Introduction to Biotechnology Science	3
BIOS 1200	Biotechnology Science Lab Skills	5
BIOS 1500	Introduction to Biochemistry	4
BIOS 1600	Advanced Molecular Separations	4
BIOS 2100	Applied Microbiology	3
BIOS 2400	Tissue Culture	3
BIOS 2500	Recombinant DNA Technology	4

BIOS 2550	Introduction to Bioinformatics	1
BIOS 2600	Bioscience Manufacturing Processes	4
BIOS 2700	Internship	3
BIOS 2800	Biotechnology Science Seminar	1

Certificate Total: 35

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit lkn.lakelandcc.edu/go/ge?q=3751.

Bioinformatics Concentration (9376)

Bioinformatics develops and uses computer software to analyze and manage biological data. Bioinformatics is fundamental to modern biological research and to the development of individualized medicine that will combine genome analysis, medical records, and results of clinical trials and research to tailor treatments and prevention regimen. Graduates of this program will fill the need for scientists with knowledge of biology, genetics, molecular biology, database management, and computer programming. This program is a hybrid technical program that contains approximately equal amounts of Lakeland's biotechnology science and information technology/computer science courses. Job opportunities include biology and biomedical research, healthcare, and biomedical informational services sectors.

A minimum GPA of 2.0 and a grade of "C" or above is required for all science, math and program specific courses.

ADMISSION PROCEDURES

Students must meet specific admission requirements for this program. Listed below are requirements for admission to the Bioinformatics Program:

- Complete college application(s)
- Submit high school transcript as well as any college transcript(s).
- Meet with the Biotechnology Science program director to obtain a program application form.
- Meet with a counselor to review program prerequisites and requirements.
- Completion of high school chemistry with a grade of "C" or above or successful completion of CHEM 1100 Elementary Chemistry.
- Successful completion of MATH 0950 Intermediate Algebra or placement into MATH 1650 College Algebra.
- Successfully complete the CIS Tech Prep program OR have waived with equivalent high school or college coursework the following course:

ITIS 1005 Computers and Information Processing or ITIS 1007 Principles of Information Technology & Computer Science

OR

Complete ITIS 1005 Computers and Information Processing or ITIS 1007 Principles of Information Technology & Computer Science with a grade of "C" or better

First Semester:

BIOL 1510	Principles of Biology I	4
CHEM 1500	General Chemistry I	5
ENGL 1110*	English Composition I (A)	3
OR		
ENGL 1111	English Composition I (B)	
FYEX 1000	First Year Experience	1
	Choose course(s) from the Arts and Humanities Electives list	3
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Second Semester:

BIOS 1500	Introduction to Biochemistry	4
ITCS 1010	Programming Logic	3
ITIS 1008	Ethics in Information Technology	1
ITON 1070	Operating Systems: Skills and Techniques	1
ITON 1205	Network+ and Networking Essentials	2
	Choose course(s) from the Related Electives list	4
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Biotechnology Science

Summer:

ITDB 1400	Introduction to SQL	2
ITIS 1520	Microsoft Excel: Skills and Techniques	3

Third Semester:

BIOS 2500	Recombinant DNA Technology	4
ITCS 1870	Python Programming I	3
ITDB 1405	Oracle PL/SQL Programming	2
ITON 1748	Linux Administration I	3
MATH 1550	Statistics	4

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Fourth Semester:

BIOS 2400	Tissue Culture	3
BIOS 2550	Introduction to Bioinformatics	1
BIOS 2700	Internship	3
BIOS 2800	Biotechnology Science Seminar	1
COMM 1000	Effective Public Speaking	3
Choose course(s) from the Social and Behavioral Science Electives list		3

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Program Total: 66

**English course selection is based on placement test results (ENGL 1111 is 4 credits, only 3 credits apply to the degree). Students who place into ENGL 1111 should consult with the program chair.*

Related Electives: minimum 4 credits

BIOL 2700	Microbiology	4
BIOL 1520	Principles of Biology II	4
MATH 1650	College Algebra	4

Arts and Humanities Electives: minimum 3 credits

ARTS 1120, 2220, 2230; ENGL 2250, 2260, 2280, 2290; HUMX 1100, 1200; MUSC 1200, 1215, 1800, 2200, 2250; PHIL 1500, 2000; PHOT 1000

Social and Behavioral Sciences Electives: minimum 3 credits

ANTH 1160; ECON 1150, 2500, 2600; GEOG 1500, 1600, 2500; HIST 1150, 1250, 2150, 2250; POLS 1300, 2500; PSYC 1500; SOCY 1150

Lakeland Community College Admission Requirements

For admission into Lakeland, students must be a high school graduate or have obtained a high school diploma equivalency. Please consult Lakeland Community College's Enrollment Guide (available on Lakeland's website at lakelandcc.edu/enrollment) for specific admissions requirements and procedures.

Biotechnology Science Program Admission Requirements

Students must meet specific admission requirements for this program. Listed below are requirements for admission to the biotechnology science program:

- Complete college application(s).
- Submit high school transcript as well as any college transcript(s).
- Meet with the biotechnology science program director to obtain a program application form.
- Meet with a counselor to review program prerequisites and requirements.
- Completion of high school chemistry with a grade of "C" or above or successful completion of CHEM 1100 Elementary Chemistry.
- Successful completion of MATH 0950 Intermediate Algebra or placement into MATH 1650 College Algebra.

For more information

1.800.589.8520 • lakelandcc.edu
Joseph C. Deak, Ph.D.
Biotechnology Science Program Director
440.525.7466 • jdeak@lakelandcc.edu
lakelandcc.edu/bioscience

Curriculum and program requirements are subject to change. Find the most up-to-date information in the college catalog, available on the website at lakelandcc.edu.



Quality Education

Lakeland prepares you for a high-demand career or for transfer to a four-year college or university. Professors at Lakeland are experts in their fields with real-world experience. Small class sizes allow for personalized attention.



Affordable Tuition

Save thousands on your college education. Lakeland's tuition is about one-third the cost of most four-year schools. Financial assistance is available, including federal and state grants, scholarships, loans, and work study employment.



Convenience

Lakeland offers convenient day, evening and weekend class times, and a growing number of online courses. The main campus in Kirtland is only 20 miles northeast of Cleveland. Classes are also offered in Madison.



Focus on Students

Lakeland offers a variety of student services to help you succeed, such as counseling, tutoring, wireless computer labs, career services, free parking, and affordable child care.

Accreditation

Lakeland Community College is accredited through the Higher Learning Commission (HLC) and participates in the Academic Quality Improvement Program (AQIP). The Higher Learning Commission, 230 South LaSalle Street, Suite 7-500, Chicago, IL 60604-1413, phone: 800.621.7440, www.hlcommission.org.

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