

Glendale College

Course Outline of Record Report

Course ID 010548
Revision - November 2025

BIOL141 : Applied Biotechnology I with Laboratory

General Information

Author:	• Karoline Rostamiani
Attachments:	DE Addendum_BIOL_141 COR_2:1:2021 CoDE_4:23:2024.pdf
Course Code (CB01) :	BIOL141
Course Title (CB02) :	Applied Biotechnology I with Laboratory
Department:	BIOL
Proposal Start:	Fall 2026
TOP Code (CB03) :	(0403.00) Microbiology
CIP Code:	(41.0101) Biology/Biotechnology Technology/Technician.
SAM Code (CB09) :	C - Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000624421
Curriculum Committee Approval Date:	11/26/2025
Board of Trustees Approval Date:	Pending
Last Cyclical Review Date:	02/01/2021
Course Description and Course Note:	BIOL 141 prepares students for the biotechnology industry by emphasizing the core concepts practiced in a bioscience laboratory. Topics include laboratory math, basic chemistry of buffers, laboratory safety, quality control, biological molecules, gene expression, cell structure and molecular biology techniques. This course introduces students to standard biotechnology laboratory skills including laboratory measurements, preparation of media and solutions, data collection and evaluation, basic separation methods, molecular techniques, aseptic techniques and documentation. Good communication and collaborative work are emphasized. This course is intended for, but not limited to, students preparing for a career in biotechnology. Note: A material/lab fee may be required for this course.
Justification:	Content Change
Academic Career:	• Credit
Mode of Delivery:	No value
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Biological Sciences
Alternate Discipline:	• Biotechnology
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade Only

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

GCC General Education Requirements

Area 5: Natural Sciences

Area

Natural Sciences

Status

Approved

Approval Date

09/02/2025

Comparable Course

No Comparable Course defined.

C-ID

BIOT

Area

Biotechnology

Status

Approved

Approval Date

08/30/2021

Comparable Course

BIOT 150 X - Applied Biotechnology with Laboratory

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	144
Total Course Out-of-Class Hours	72
Total Student Learning Hours	216

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Variable Credit Course

Funding Agency Category (CB23)

This course was primarily developed using Economic Development funds.

Cooperative Work Experience Education

Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	2	4
Laboratory Hours	6	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks) 18

Hours per unit divisor 0

Course In-Class (Contact) Hours

Lecture 36

Laboratory 108

Studio 0

Total 144

Course Out-of-Class Hours

Lecture 72

Laboratory 0

Studio 0

Total 72

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Prerequisites, Corequisites, Recommended Corequisites, and Recommended Preparation

Advisory

BIOL140 - Introduction to Biotechnology (in-development)

Objectives

- List the morphologic and chemical differences between prokaryotic and eukaryotic cells
- Define and distinguish among atoms, molecules, compounds, chemical bonds, mechanisms of chemical bond formation, and components of biological molecules
- Construct the flow diagram of gene expression from DNA to protein
- Translate the triplet code of DNA into primary protein structure
- Assess the role of basic Mendelian genetics
- Compare and contrast current applications of biotechnology to the areas of medicine, agriculture, diagnostics, and the environment
- Evaluate a recent development in the field of biotechnology from an ethical perspective
- Demonstrate pipetting skills

- Explain the importance of Good Laboratory Practices and record keeping 11
- Prepare and analyze graphs
- Explain how an antibody-based assay works (e.g. ELISA)
- Perform bacterial transformation
- Use of aseptic techniques in lab procedures, such as handling of bacteria, microbiology and molecular biology work.
- Demonstrate proficiency in basic molecular techniques (e.g. DNA and protein analysis techniques)
- Identify parts of a microscope
- Use a microscope to view specimens
- Employ a lab protocol and explain deviations from the protocol

OR

Advisory

BIOL101 - General Biology I

Objectives

- Identify the properties of lipids, carbohydrates, proteins, and nucleic acids.
- Describe the structure of prokaryotic and eukaryotic cells.
- Describe and identify the different stages in mitosis.
- Describe the processes of DNA replication, transcription, and translation.
- Explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes.
- Demonstrate proper use of laboratory equipment including the microscope, spectrophotometer, and micropipettes.
- Demonstrate proficiency with data collection, analysis, and graphical representation.

OR

Advisory

BIOL112 - Microbiology

Objectives

- Demonstrate general knowledge of the physical and chemical structure of prokaryotes and eukaryotes.
- Demonstrate an understanding of the biochemical processes of the cell, including cell respiration, DNA replication, genetic recombination, transcription, translation, and cellular transport.
- Demonstrate an understanding of the physical and chemical methods and mechanisms used to control microbial growth.
- Demonstrate proper aseptic techniques and proficiency in performing various staining procedures and biochemical tests on microorganisms.

OR

Advisory

BIOL122 - Introduction To Biology

Objectives

- Describe the structure of atoms, the properties of water and structure and function of biological macromolecules.
- Describe the flow of information from DNA to protein.
- Compare prokaryotic and eukaryotic cells, and describe the structure and function of eukaryotic organelles.

AND

Advisory

Satisfactory completion of a course taught at or above the level of intermediate algebra.

AND

Advisory

CHEM110 - Elements Of General Chemistry

Objectives

- Clearly explain qualitative chemical concepts and trends.
- Perform laboratory experiments using appropriate techniques and safety procedures.

- Describe, model, and analyze microscopic behavior to explain macroscopic properties as applied to chemical bonding, gas laws, atomic theory, acids, bases, nuclear chemistry, and oxidation-reduction.

OR

Advisory

CHEM120 - Fundamentals Of College Chemistry (Inorganic)

Objectives

- Evaluate scientific statements and develop an opinion as to their validity
- Identify and describe basic chemical data, rules, and laws

AND

Advisory

ENGLC1000 - Academic Reading and Writing

Objectives

- Write timed, in-class essays exhibiting acceptable college-level control of mechanics, organization, development, and coherence.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Find, evaluate, analyze, and interpret primary and secondary sources, incorporating them into written essays using appropriate documentation format.
- Proofread and edit essays for presentation so they exhibit no disruptive errors in English grammar, usage, or punctuation.

OR

Advisory

ENGLC1000E - Academic Reading and Writing

Objectives

- Write timed, in-class essays exhibiting acceptable college-level control of mechanics, organization, development, and coherence.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Find, evaluate, analyze, and interpret primary and secondary sources, incorporating them into written essays using appropriate documentation format.
- Proofread and edit essays for presentation so they exhibit no disruptive errors in English grammar, usage, or punctuation.

OR

Advisory

ENGLC1000H - Academic Reading and Writing - Honors

Objectives

- Write timed, in-class essays exhibiting acceptable college-level control of mechanics, organization, development, and coherence.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Proofread and edit essays for presentation so they exhibit no disruptive errors in English grammar, usage, or punctuation.
- Find, evaluate, analyze, and interpret primary and secondary sources, incorporating them into written essays using appropriate documentation format.

Entry Standards

Entry Standards

Description

No value

No value

Course Limitations	
Cross Listed or Equivalent Course	Description
No value	No value

Requisite Validation
Upload Statistical Validation and/or other documents (if necessary)
No Value

Specifications	
Methods of Instruction	
Methods of Instruction	Laboratory
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations
Methods of Instruction	Field Activities (Trips)
Methods of Instruction	Guest Speakers
Methods of Instruction	Presentations

Methods of Instruction Lecture

Out of Class Assignments

1. Reading assigned chapters in course textbook(s), laboratory manual, and/or relevant scientific articles.
2. Homework assignment aimed at explaining and recognizing major concepts (e.g. making buffers, dilutions, constructing recombinant DNA, restriction enzyme analysis and gel electrophoresis.)
3. Maintaining lab notebook that contains laboratory protocols (e.g. a written protocol that includes the title, purpose, materials needed, procedures, and results) and test results.
4. Pre-lab quizzes.
5. Written lab report.

Methods of Evaluation

Description of Activity/Interaction

Presentation (group or individual)	Class presentation
Activity (answering journal prompt, group activity)	Class and laboratory activities and experiments
Writing Assignment	Writing assignments that assess the ability to apply good laboratory practices to reports and lab notebooks (e.g. data collection and modifications to laboratory protocols, Standard Operating Procedures).
Activity (answering journal prompt, group activity)	Laboratory practica that assess the ability to prepare and analyze graphs, follow a protocol, demonstrate basic lab skills and workplace competency, and explain deviations from the protocol.
Exam/Quiz/Test	Objective written examinations and quizzes that test for definitions and application of major concepts
Other	Field trip

Textbook Rationale

Newer editions of the books are not available.

Textbooks

Author	Title	Publisher	Date	ISBN
Simon, Eric J.	Campbell Essential Biology	Pearson	2018	978-0134812946
Thienman, Willian J.	Introduction to Biotechnology	Pearson	2018	978-0134650197
Brown, J. Kirk	. Biotechnology: A Laboratory Skills Course	Bio-Rad	2018	9780983239635, 0983239630
Seidman, Lisa A.	Laboratory Manual for Biotechnology and Laboratory Science: The Basics. Boston	Pearson	2011	9780321644022

Other Instructional Materials (i.e. OER, handouts)

Description	Biomanufacturing Laboratory Manual
Author	Northeast Biomanufacturing Center and Collaborative
Citation	No value
Online Resource(s)	No value

Learning Outcomes**Course Objectives**

Describe cell structure

Apply principals of basic chemistry of buffers and pH to biological molecules

Define and distinguish among biological molecules

Construct the flow diagram of gene expression from DNA to protein

Explain recombinant DNA

Convert between metric units

Perform basic dilutions

Perform calculations related to reagents, solutions and media formulations

Demonstrate Good Laboratory Practices (as defined by industry) and record keeping in a laboratory notebook 10 Prepare and analyze graphs

Grow cells using aseptic techniques

Demonstrate ability to use measurement instrumentation properly

Perform a concentration assay for DNA or Protein

Successfully perform a basic bio-separation technique such as column chromatography

Perform a molecular technique such as DNA sizing electrophoresis

Demonstrate work-readiness skills

Prepare and analyze graphs

SLOs

Apply knowledge of cell, molecular, and microbiology to isolate, quantify, and study the important biomolecules of cells.

Expected Outcome Performance: 70.0

BIOL
Biotechnology A.S. Degree

- Acquire work-readiness skills
- Fulfill requirements for transfer to a college with a BS in Biotechnology
- Learn skills necessary for a lab technician job
- Master advanced biotechnology laboratory skills and good documentation practices

BIOL
Biotechnology Certificate

- Acquire work-readiness skills
- Learn skills necessary for a manufacturing technician job
- Master basic biotechnology laboratory skills

BIOL
Biotechnology Research Lab
Technician Certificate

- Acquire work-readiness skills
- Learn necessary skills for a lab technician job
- Master advanced biotechnology laboratory skills and good documentation practices

BIOL
Biotechnology Research Lab
Assistant Certificate

- Acquire work-readiness skills
- Learn skills necessary for a manufacturing or biomanufacturing technician job
- Master basic biotechnology laboratory skills and good documentation practices in biomanufacturing

ILOs
Core ILOs

Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

Properly record and document data and data analyses in an organized lab notebook.

Expected Outcome Performance: 70.0

BIOL
Biotechnology Research Lab
Technician Certificate

- Acquire work-readiness skills
- Learn necessary skills for a lab technician job
- Master advanced biotechnology laboratory skills and good documentation practices

BIOL
Biotechnology A.S. Degree

- Acquire work-readiness skills

- Fulfill requirements for transfer to a college with a BS in Biotechnology

- Learn skills necessary for a lab technician job

- Master advanced biotechnology laboratory skills and good documentation practices

BIOL
Biotechnology Research Lab
Assistant Certificate

- Acquire work-readiness skills

- Learn skills necessary for a manufacturing or biomanufacturing technician job

- Master basic biotechnology laboratory skills and good documentation practices in biomanufacturing

BIOL
Biotechnology Certificate

- Acquire work-readiness skills

- Learn skills necessary for a manufacturing technician job

- Master basic biotechnology laboratory skills

ILOs
Core ILOs

- Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

- Communicate clearly, ethically, and creatively; listen actively and engage respectfully with others; consider situational, cultural, and personal contexts within or across multiple modes of communication.

Apply and demonstrate good laboratory safety and aseptic techniques to make appropriate solutions and culture media to grow cells.

Expected Outcome Performance: 70.0

BIOL
Biotechnology Certificate

- Acquire work-readiness skills

- Learn skills necessary for a manufacturing technician job

- Master basic biotechnology laboratory skills

BIOL
Biotechnology Research Lab
Assistant Certificate

- Acquire work-readiness skills

- Learn skills necessary for a manufacturing or biomanufacturing technician job

- Master basic biotechnology laboratory skills and good documentation practices in biomanufacturing

BIOL
Biotechnology Research Lab
Technician Certificate

- Acquire work-readiness skills

- Learn necessary skills for a lab technician job

- Master advanced biotechnology laboratory skills and good documentation practices

BIOL
Biotechnology A.S. Degree

- Acquire work-readiness skills

- Fulfill requirements for transfer to a college with a BS in Biotechnology

- Learn skills necessary for a lab technician job

- Master advanced biotechnology laboratory skills and good documentation practices

ILOs
Core ILOs

- Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.

- Practice ethical and responsible behavior within personal, academic, professional, social, and societal contexts; recognize and welcome diverse lifestyle choices that promote physical, intellectual, psychological, and social well-being.

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No Value

Is this proposal submitted in response to learning outcomes assessment data?

No Value

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Scientific Method (1.5 hours)

Biotechnology Overview (1.5 hours)

Molecular and Cell Biology (18 hours)

- Biological molecules (proteins, carbohydrates, lipids, nucleic acids)
- Cell structures (prokaryotes and eukaryotes)
- Gene expression
- DNA technology and analysis
- Cell culture and fermentation
- Bioseparation (protein purification, agarose gel, etc.)

Bacterial Cell Culture Methods (1.5 hours)

- Preparation and sterilization of bacterial media
- Growth and maintenance of bacterial cultures

Mammalian Cell Culture Method (1.5 hours)

- Preparation and sterilization of media for mammalian cells
- Growth and maintenance of mammalian cultures

Laboratory Math (6 hours)

- Units of measurement and converting between units (metric system)
- Graphical methods of analysis and data display
- Various methods for expressing concentration
- Calculation for molar and percent solution
- Dilutions
- Reagents, solutions and media formulations

Basic Chemistry of Buffers and pH (1 hours)

Common Laboratory Measurements (2 hours)

- Weight
- Volume
- pH
- Temperature
- Spectrophotometry

Health and Safety (1 hour)

- MSDS/SDS
- Personal Protection Equipment
- Contamination

Work-Readiness Skills (2 hours)

- Oral communication, presentation
- Written communication
- Teamwork, team building exercises
- Industry expert and/or career counselor workshops
- Resume writing
- Interview skills
- Job searching

Total hours=36**Laboratory/Studio Content****Laboratory Basic Skills (3 hours)**

- Application of laboratory math

Laboratory Basic Skills (4 hours)

- Micropipetting and serological pipetting skills

Laboratory Basic Skills (2 hours)

- Laboratory safety practices

Laboratory Basic Skills (3 hours)

- Aseptic techniques

Laboratory Basic Skills (3 hours)

- Good manufacturing practices

Laboratory Basic Skills (6 hours)

- Preparation of various solutions at different concentrations

Laboratory Basic Skills (3 hours)

- Proper dilution of solutions, media

Laboratory Basic Skills (3 hours)

- Preparation and analysis of buffers

Laboratory Basic Skills (6 hours)

- Preparation of biological solutions (media preparation, autoclaving, pH determination and adjustments, measuring, balances, volumes)

Laboratory Basic Skills (3 hours)

- Agarose gels testing

Laboratory Basic Skills (3 hours)

- Uses of polyacrylamide gels

Laboratory Basic Skills (3 hours)

- Spectrophotometry

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- Bacterial cell transformation

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- Plasmid isolation

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- Chromosome isolation

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- electrophoresis

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- Restriction digestion and analysis

General Biotechnology and Molecular Techniques Used in Industry: DNA (6 hours)

- Cloning

General Biotechnology and Molecular Techniques Used in Industry: DNA (3 hours)

- PCR

General Biotechnology and Molecular Techniques Used in Industry: Proteins (3 hours)

- Protein isolation

General Biotechnology and Molecular Techniques Used in Industry: Proteins (2 hours)

- Protein quantification

General Biotechnology and Molecular Techniques Used in Industry: Proteins (6 hours)

- Western blot

General Biotechnology and Molecular Techniques Used in Industry: Proteins (3 hours)

- Column chromatography

General Biotechnology and Molecular Techniques Used in Industry: Antibodies (3 hours)

- ELISA (enzyme-linked immunosorbent assay)
- Western Blot

Inoculation/growth of Cell Cultures (6 hours)

Lab Safety (2 hours)

Documentation and Record Keeping (3 hours)

- Physical lab notebook
- E-notebook (e.g. Benchling.com)

Data Collection and Evaluation (3 hours)

Standard Operating Procedures (SOP) (3 hours)

Work-Readiness Skills (8 hours)

- Oral communication, presentation
- Written communication
- Teamwork, team building exercises
- Industry expert and/or career counselor workshops
- Resume writing
- Interview skills
- Job searching

Total hours = 108

Additional Information

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Is it possible this course will have a material fee?

Yes

I have contacted my library liaison (<https://campusguides.glendale.edu/faculty/liasons>):

No

What term(s) will this course be offered?

Fall/Spring

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value