Glendale College

Course Outline of Record Report

Course ID 010807

Created - November 2025

BIOL142H : Honors Applied Biotechnology II with Laboratory

General Information

Author:	• Karoline Rostamiani
Course Code (CB01) :	BIOL142H
Course Title (CB02) :	Honors Applied Biotechnology II with Laboratory
Department:	BIOL
Proposal Start:	Fall 2026
TOP Code (CB03) :	(0430.00) Biotechnology and Biomedical Technology*
CIP Code:	(41.0101) Biology/Biotechnology Technology/Technician.
SAM Code (CB09) :	B - Advanced Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000658702
Curriculum Committee Approval Date:	11/26/2025
Board of Trustees Approval Date:	01/13/2026
Last Cyclical Review Date:	11/26/2025
Course Description and Course Note:	BIOL 142H is the second course in the Applied Biotechnology series. It introduces advanced concepts and laboratory techniques in biotechnology. Building on the basic skills established in BIOL 141, students learn methodology in large-scale protein production and protein purification techniques, including sample preparation. It provides hands-on training with chromatography systems and assays used in industry and research laboratories. This course also covers methods utilized for eukaryotic cell culture protein purification. Application of current Good Manufacturing Process (cGMP), Good Laboratory Practice (GLP), and Standard Operating Procedures (SOP's) in relation to these techniques will be addressed. Good communication, collaborative work and work- readiness skills are emphasized. This course is intended for, but not limited to, students preparing for a career in biotechnology. The Honors course may be enhanced in one or more of the following ways: 1. enriched reading opportunities, such as scholarly sources, 2. enriched critical thinking opportunities, such as oral presentation of research and experiential learning. Note: A material/lab fee may be required for this course.
Justification:	New Course
Academic Career:	• Credit
Mode of Delivery:	• In-Person
Author:	• Karoline Rostamiani
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Biological Sciences

Alternate Discipline: • Biotechnology

Alternate Discipline: No value

File Upload

File Upload

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 with Pass / No-Pass Option

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

Pending

C-ID	Area	Status	Approval Date	Comparable Course
BIOT	Biotechnology	Pending	No value	BIOT 220 X - Methods in Protein Purification

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.

Funding Agency Category (CB23)

This course was primarily developed using Economic Development funds.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

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	54
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

Prerequisite

BIOL141 - Applied Biotechnology I with Laboratory

Objectives

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

- Explain recombinant DNA
- 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

OR

Prerequisite

BIOL298 - Undergraduate Research in Microbiology and Molecular Biology

Objectives

- Demonstrate aseptic laboratory techniques and safe laboratory practices.
- Communicate effectively in a collaborative work environment.
- Apply chemical formulas to make appropriate media
- Troubleshoot problems when carrying out experiments.
- Keep meticulous daily records of lab activities, experimental procedures, outcomes of experiments, and creative thoughts in a lab notebook.
- Demonstrate competence in use and application of various equipment and techniques used in molecular biology and microbiology.
- Read and analyze peer-reviewed articles in the field of study.

AND

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
- 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

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

CHEM101 - General Chemistry A

Objectives

- Apply bonding theories to describe the nature of ions and molecules.
- Demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely.
- Describe the scientific method and apply it to the development of the science of chemistry.

Entry Standards

Entry Standards	Description
Demonstrate general knowledge of the physical and chemical structure of prokaryotes and eukaryotes.	No Value
Demonstrate an understanding of the biochemical processes of the cell, including cell respiration, DNA replication, genetic recombination, transcription, translation, and cellular transport.	No Value
Demonstrate an understanding of the physical and chemical methods and mechanisms used to control microbial growth.	No Value
Demonstrate proper aseptic techniques and proficiency in performing various staining procedures and biochemical tests on microorganisms.	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	Lecture
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

Out of Class Assignments

- Field trip
- Read relevant research articles

- Maintaining lab notebook that contains laboratory protocols (e.g. a written protocol that includes the title, purpose, materials needed, procedures, and expected results)
- Lecture homework assignment to understand lecture concept
- Pre-lab quizzes
- Written lab report
- Enriched reading opportunities, such as scholarly sources (Honors Enhancement)
- Oral presentation of research and experiential learning (Honors Enhancement)

Methods of Evaluation	Description of Activity/Interaction
Exam/Quiz/Test	Class presentation
Exam/Quiz/Test	Class and laboratory activities and experiments
Exam/Quiz/Test	Writing assignments that assess the ability to apply Good Laboratory Practices to reports and record keeping in lab notebooks (e.g. data collection and modifications to laboratory protocols, Standard Operating Procedures, lab report)
Exam/Quiz/Test	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	Written examinations and quizzes

Textbook Rationale

Newer editions of the books are not available.

Textbooks

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

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

No Value

Learning Outcomes

Course Objectives

Correctly perform laboratory calculations.
Correctly use precision measuring devices.
Describe the principles of commonly used protein assays.
Perform chromatography and other separation methods for protein purification.
Describe and/or demonstrate techniques for isolation of proteins from cells and tissue.
Perform standard column chromatography techniques.
Correctly record procedures and maintain an organized laboratory notebook.
Describe biological concepts related to basic DNA recombinant technology and protein isolation and analysis that are routinely used in the biotechnology laboratory.
Use purification analysis data to improve purification procedure.
Demonstrate work-readiness skills.

SLOs

Demonstrate industry standards of Good Manufacturing Practice (GMP), Good Documentation Practice (GDP), and Standard Operating Practice (SOP) while carrying out the laboratory procedures and experiments.
Expected Outcome Performance: 70.0

Manufacture proteins by transforming cells with recombinant plasmids and isolate, purify, and analyze the quantify and quality of the protein.
Expected Outcome Performance: 70.0

Additional SLO Information

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

No

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

No

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

Overview of Cell Biology and Genetics (6 hours)
- Overview of prokaryotic and eukaryotic cell structures
- Overview of gene structure and gene expression in prokaryotes and eukaryotes

Cloning Strategies (7 hours)
- Protein structure and modification in prokaryotes and eukaryotes
- Cloning strategies for inducible protein expression DNA analysis (restriction enzymes, gel electrophoresis, spectrophotometer for quantification)

Concentration and Dilution Calculations and Generation of Standard Curve For Protein Analysis (2 hours)
Preparation of Buffers, Resins, and Reagents Used in Potein Purification (3 hours)
Correct Use of Equipment Ued For Protein Purification Techniques (3 hours)
Basic Column Chromatographic Methods (2 hours)
- Column chromatography
- HPLC (High Performance Liquid Chromatography)

Quantitative Analysis of Chromatographic Fractions and Purified Protein (2.5 hours)
- SDS-PAGE (sodium dodecyl sulfate polyacrylamide gel electrophoresis)
- Activity assay
- Western blot

Principles of Separation Methods including Centrifugation, Chromatography (e.g., ion exchange, size exclusion, hydrophobic interaction, affinity), Electrophoresis and Filtration as Related to Protein Purification and Product Analysis (3.5 hours)
Sample Preparation (harvest, cell disruption, etc.) (1 hour)
Purification Strategy Design and Data Analysis (2 hours)
Contaminants and Impurities (1 hour)
Industry Practices (3 hours)
- GLP (Good Laboratory Practice)
- cGMP (Current Good Manufacturing Practice)
- SOP's (Standard Operating Procedures)
- Use of lab notebooks or other laboratory documentation methods (e.g. e-notebook, Benchling)

Total hours: 36

Laboratory/Studio Content

Perform Calculations For Preparation of Solutions, Buffer, Media (9 hours)
- For growth and maintenance of cell cultures
- For protein purification
- For gel electrophoresis

Upstream Processing: Genetic Cloning and Cell Culture (4.5 hours)
- Growth of cryogenic cells
- Transformation of E. coli with reporter gene (e.g. GFP or lacZ)

Upstream Processing: Genetic Cloning and Cell Culture (8 hours)
- Growth of cells in large volume

- Introduction to use of bioreactor
- Maintenance of bioreactor

Upstream Processing: Genetic Cloning and Cell Culture (6 hours)
- Spectrophotometry, measurement of cell density

Downstream Processing: Preparation of Samples For Protein Purification (8 hours)
- Protein extraction

Downstream Processing: Preparation of Samples For Protein Purification (8 hours)
- Analyze yield, protein quantification

Downstream Processing: Preparation of Samples For Protein Purification (9 hours)
- Protein purification: chromatography

Downstream Processing: Preparation of Samples For Protein Purification (9 hours)
- Protein purification: HPLC

Downstream Processing: Preparation of Samples For Protein Purification (8 hours)
- Protein purification: gel electrophoresis, SDS-PAGE

Downstream Processing: Preparation of Samples For Protein Purification (8 hours)
- Protein purification: Western blot

Perform Calculations For Data Analysis (9 hours)
- Calculations for dilutions and conversions
- Analysis of data

Write Standard Operating Procedures (SOPs) (5 hours)
- Write procedures for equipment use
- Write procedures to conduct experiments

Follow Good Documentation Practice (GDP) (9 hours)
- Record keeping in organized lab notebooks or e-notebook
- Record and maintain documents in binders (batch record, media/buffer prep sheets, validation forms
- Record Data analyses

Introduction to Good Manufacturing Practices (GMP) (3 hours)
- GMP popcorn lab

Industry expert and career counselor workshops (4.5 hours)
- 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/liaisons):

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