

Glendale College

Course Outline of Record Report

Course ID 010211

Revision - May 2023

BIOL298 : Undergraduate Research in Microbiology and Molecular Biology

General Information

Author:	<ul style="list-style-type: none"> Karoline Rostamiani
Course Code (CB01) :	BIOL298
Course Title (CB02) :	Undergraduate Research in Microbiology and Molecular Biology
Department:	BIOL
Proposal Start:	Spring 2024
TOP Code (CB03) :	(0430.00) Biotechnology and Biomedical Technology*
CIP Code:	(15.0401) Biomedical Technology/Technician.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	Yes
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000557468
Curriculum Committee Approval Date:	05/10/2023
Board of Trustees Approval Date:	06/20/2023
Last Cyclical Review Date:	11/01/2019
Course Description and Course Note:	<p>BIOL 298 is intended to give undergraduate students hands-on experience in microbiology and molecular biology research while working collaboratively in a laboratory setting with a faculty-led team of students on various projects. It allows the student to practice and apply various scientific techniques and methods (e.g. wet lab skills) and concepts learned in biology (e.g. molecular biology, microbiology, genomics, and bioinformatics). Students are expected to apply knowledge from prerequisite courses, to use their problem solving skills in carrying out assigned projects, and to write up and present the results of their research on-campus.</p>
Justification:	Coding/Category Change
Academic Career:	<ul style="list-style-type: none"> Credit

Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none"> Biological Sciences
Alternate Discipline:	No value
Alternate Discipline:	No value

Transferability & Gen. Ed. Options

General Education Status (CB25)

Not Applicable

Transferability

Transferable to CSU only

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	126
Total Course Out-of-Class Hours	36
Total Student Learning Hours	162

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)

Not Applicable.

Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	1	2
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	18
Laboratory	108
Studio	0
Total	126
Course Out-of-Class Hours	
Lecture	36
Laboratory	0
Studio	0
Total	36

Time Commitment Notes for Students

No value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

BIOL101 - General Biology I

Objectives

- Identify the properties of lipids, carbohydrates, proteins, and nucleic acids;
- describe the structure of prokaryotic and eukaryotic cells;
- 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

Prerequisite

BIOL112 - Microbiology

Objectives

- demonstrate a general understanding of the taxonomy and major characteristics of the various microorganisms
- 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 an understanding of the disease process of various microorganisms
- demonstrate proper aseptic techniques and proficiency in performing various staining procedures and biochemical tests on microorganisms

AND

Advisory

ENGL100 - *Writing Workshop

OR

Advisory

ESL151 - Reading And Composition V

Objectives

- Read and critically analyze various academic readings;
- Summarize readings;
- compose a 500 to 550-word essay which: summarizes and cites appropriately a reading passage; includes a clear thesis statement; uses evidence to support the thesis; shows clear organization into an introduction, body, and conclusion;
- revise writing to eliminate errors in syntax, and grammatical constructions;
- employ basic library research techniques;
- compose one research paper (1,000 words) or two short research papers (500-700 words each) with citations.

Entry Standards

Entry Standards	Description
read, analyze, and evaluate contemporary articles and stories for the comprehension of difficult content and the identification of main ideas and (topic-based) evidence;	ENGL 100
write a summary of a contemporary article or story with correct citation techniques;	ENGL 100
write compositions (e.g., summaries and argumentative essays) that are easy to read and follow, though some errors in grammar, mechanics, spelling, or diction may exist;	ENGL 100
proofread and edit essays for content, language, citation, and formatting problems;	ENGL 100

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	Presentations			
Methods of Instruction	Guest Speakers			
Out of Class Assignments				
<ul style="list-style-type: none"> • Data analysis (e.g. analysis of experimental results) • Individual project (e.g. creation of a gene annotation notebook) • Written critique (e.g. of relevant scientific articles) • Group project (e.g. writing a peer-reviewed scientific article) 				
Methods of Evaluation	Rationale			
Exam/Quiz/Test	Quizzes			
Evaluation	Instructor analysis of student work			
Presentation (group or individual)	Presentations			
Activity (answering journal prompt, group activity)	Laboratory practices record keeping in lab notebook			
Activity (answering journal prompt, group activity)	Gene annotation notebook			
Activity (answering journal prompt, group activity)	Effective participation in team assignments			
Report	Group paper and formal presentation of results			
Textbook Rationale				
No Value				
Textbooks				
Author	Title	Publisher	Date	ISBN
Sadava, David E., et al	Life: The Science of Biology	W.H. Freeman	2017	978-1319010164
Lodish, Harvey	Molecular Cell Biology	WH Freeman	2016	978-1464183393
Other Instructional Materials (i.e. OER, handouts)				

Description	Assigned peer-reviewed scientific research articles
Author	No value
Citation	No value
Online Resource(s)	No value

Learning Outcomes and Objectives

Course 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

Present results of project to student peers and professors

Write a peer-reviewed article using proper citation format and documentation style

SLOs

Demonstrate proficiency in use of various molecular and microbiology techniques to complete the assigned project. Expected Outcome Performance: 70.0

BIOL Demonstrate correct use of basic biology laboratory equipment, and critically examine and interpret biological data.
Core PLOs

ILOs
General Education

analyze, interpret, and present research evidence

apply reasoning to evaluate hypotheses and theories

examine causality or associations between or among variables of the natural world

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

Aseptic Laboratory Techniques and Safe Laboratory Practices (2)

- Proper handling of bacterial cultures
- Proper preparation of bacterial growth media

Bacterial Genetics and Gene Regulation (4)

- Structural and regulatory genes in an operon
- Gene regulation in bacteria
- Transposon mutagenesis
- Bacterial genomics

Basic Wet Laboratory Skills and Recombinant DNA Technology (6)

- Proper use of pipettor
- Preparation of various bacterial growth media and stock solutions
- Preparation of antibiotics (e.g. kanamycin)
- DNA gel electrophoresis
- Extraction of plasmids using miniprep kits
- Methods for streaking bacteria
- Bacterial mating and mutagenesis
- Selection of and screening for mutants
- Genomic DNA isolation
- Restriction digestion
- DNA ligation
- Bacterial transformation via electroporation

Bioinformatics (2)

- DNA sequencing and sequence analysis
- Basic local alignment search tool (BLAST) Gene annotation

Analysis of Peer-Reviewed Scientific Research Articles (2)

- Analyze and critique relevant peer-reviewed articles
- Class presentation of analysis

Final Presentation and Documentation (2)

- Analyze results of experiments
- Troubleshoot obstacles faced during execution of experiments

- Produce collaborative research paper detailing scope and result of project
- Collaborative oral presentation of project

Total hours - 18

Laboratory/Studio Content

Aseptic Laboratory Techniques and Safe Laboratory Practices (2)

- Proper handling of bacterial cultures
- Proper preparation of bacterial growth media

Bacterial Genetics and Gene Regulation (4)

- Structural and regulatory genes in an operon
- Gene regulation in bacteria
- Transposon mutagenesis
- Bacterial genomics

Basic Wet Laboratory Skills and Recombinant DNA Technology (60)

- Proper use of pipettor
- Preparation of various bacterial growth media and stock solutions
- Preparation of antibiotics (e.g. kanamycin)
- DNA gel electrophoresis
- Extraction of plasmids using miniprep kits
- Methods for streaking bacteria
- Bacterial mating and mutagenesis
- Selection of and screening for mutants
- Genomic DNA isolation
- Restriction digestion
- DNA ligation
- Bacterial transformation via electroporation

Bioinformatics (15)

- DNA sequencing and sequence analysis
- Basic local alignment search tool (BLAST) Gene annotation

Analysis of Peer-Reviewed Scientific Research Articles (8)

- Analyze and critique relevant peer-reviewed articles
- Class presentation of analysis

Final Presentation and Documentation (19)

- Analyze results of experiments
- Troubleshoot obstacles faced during execution of experiments
- Produce collaborative research paper detailing scope and result of project
- Collaborative oral presentation of project

Total hours - 108