

College of San Mateo
Official Course Outline

1. **COURSE ID:** BIOL 122 **TITLE:** Seminar in Immunology and Applications in Biotechnology

Units: 1.0 units **Hours/Semester:** 16.0-18.0 Lecture hours; and 32.0-36.0 Homework hours

Method of Grading: Letter Grade Only

Recommended Preparation:

Students should have the ability to read and write using standard English at a college level and perform basic high school math.

2. **COURSE DESIGNATION:**

Degree Credit

Transfer credit: CSU

3. **COURSE DESCRIPTIONS:**

Catalog Description:

Seminar covering the immune system with a focus on applications in biotechnology. Course can be taken on its own but is intended as a theoretical support for applied skills learned in BIOL 121 Immunoassays Workshop: Techniques and Applications. Anyone interested in furthering their theoretical or practical understanding of the immune system to support their educational or career goals is encouraged to take this course.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**

Upon successful completion of this course, a student will meet the following outcomes:

1. Demonstrate an understanding of the human immune system and human immune reactions.
2. Describe the fundamentals of the immune reaction; specificity, diversity, tolerance and memory.
3. Describe the structure and function of antibodies and antigens.
4. Describe the applications of immunology in biological analysis.
5. Describe the applications of immunology in biological therapeutics.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**

Upon successful completion of this course, a student will be able to:

1. Outline the basic structure and function of the human immune system.
2. Explain different applications of antibodies in immunoassays.
3. Explain different applications of antibody analysis as a clinical test for disease.
4. Describe the FDA regulations for production of antibodies or immune mediators for therapeutics and the reasons for the regulations.

6. **COURSE CONTENT:**

Lecture Content:

1. The immune response: Inflammation: redness, swelling, heat and pain
2. Innate Immune System
3. Acquired Immune system; cellular response
4. Acquired Immune system; humoral response
5. Mediators of the Immune system
6. Antibodies and antigens
7. Allergic responses
8. Vaccines, vaccination and immunization
9. and applications
10. Applications overview; tools of the trade
11. Clinical analysis of the immune response
12. Using antibodies as analytical tools in research
13. Using antibodies in therapeutic applications
14. Manufacturing antibodies, polyclonal vs monoclonal, vs genetic engineering.
15. Relate course material to needs in the marketplace

Lab Content:

This course has no lab content.

TBA Hours Content:

This course has no TBA.

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Critique
- C. Activity
- D. Discussion
- E. Guest Speakers
- F. Other (Specify): Third party simulations and animations.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Summaries of research articles that include evaluation of science presented and assessment of author credentials

Reading Assignments:

Textbooks and scientific research articles.

Other Outside Assignments:

Modeling assignments to demonstrate comprehensive understanding of the immune response to a variety of challenges.

Design theoretical strategies for vaccination using traditional and molecular approaches.

Case-study review and written or oral analysis of immune-based diagnostic strategies and approaches in research and clinical applications.

Case-study review and written or oral analysis of strategies and approaches of the pharmaceutical and biotechnology industry discovery, design and development of immune-based biological therapeutics.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Class Work
- C. Exams/Tests
- D. Homework
- E. Papers
- F. Quizzes

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Betts, J. Gordon ,et al. *Anatomy & Physiology*, 2021 ed. OpenStax, 2021
- B. Kelly C. Whittaker and Ruo-Pan Huang. *Antibody Arrays Methods and Protocols*, 1st ed. Switzerland AG: Springer Nature, 2021

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Curriculum Committee Approval Date: January 2022

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Course Originator: Christopher Smith