MMBio467 - Immunology Lab

Fall Semester 2025 Credit Hours: 1

1:00pm-3:50pm, Wednesdays, 2129 LSB

Instructor: Dr. Sandra Hope **Office:** 3134 LSB **Office Phone:** 801-422-1310
Email: sandra_hope@byu.edu **Office hours**: Mondays 3pm-4pm, Thursdays 1pm-3pm

Prerequisites

Concurrent or past enrollment in MMBio261 Infection and Immunity OR MMBio463 Immunology.

Required Materials

- Pen and pencil
- 2 Lab Books (i.e. "Composition" notebooks to write in – you need 2)
- Lab Manual (packet from bookstore)
- Lab coat (may be provided in class)

Course Description

This course is designed to learn laboratory skills used in immunology research. Topics include mouse handling and dissection, WBC isolation and identification, antibody testing, Flow Cytometry, lymphocyte and macrophage responses, and bone marrow culture.

Course Purpose

This course presents up-to-date techniques used in Immunology research. You will better understand the materials and methods used when experiments are setup to determine immunological processes. You will also better understand experimental design and vital controls needed when setting up experiments for flow cytometry.

Course Learning Outcomes

1. Understand advanced laboratory concepts of Immunology by completing protocols and experiments.
   *Relates to Program Learning Outcome: "Exhibit mastery of four of the principal areas of the discipline", one of which is Immunology.
2. Understand experimental design used in immunology research and determine the soundness of immunological data according to the design and controls used in the experiment.
   *Relates to Program Learning Outcome: "Devise experiments with appropriate hypotheses and controls."
3. Obtain and interpret experimental data.
   *Relates to Program Learning Outcome: "Interpret experiments from primary scientific (biological) literature, analyzing the use of the scientific method, critiquing the rationale, methods, and conclusions in light of relevant scientific principles."
4. Maintain a research lab book with experimental protocol, data, and discussion of results.
   *Relates to Program Learning Outcome: Communicate scientific information using both oral and written methods.
5. Expand the student's understanding of immunology research and acknowledge the miracle of immunological processes. Develop good social skills through participation in laboratory experiments with other students.
   *Relates to Program Learning Outcome: Reflect/discuss/explore how faith in the Lord and Christ-like living are affected by an understanding of fundamental biological processes.

Classroom Procedures

-Lab attendance is taken for credit.
-Wear a lab coat and bring a lab book and pen.
-Read the lab manual pages for each procedure before lab.
-Take the online quiz before attending lab.
-Work in groups of three or four.
-Cleaning up the area before leaving lab (or lose attendance points).

Recommended Study Habits & Tips

-Check Learning Suite for announcements and up-coming experiments and quizzes.
-Call or e-mail other students with questions or ask questions about lab in lecture class.
-Ask questions during lab or visit me or the TA during office hours.

Assessment Breakdown

Assessments	Points Possible	Weighted Percent of Semester Grade
Attendance (-30 points per missed lab, beginning Sept. 10)	90	15%
Online Quizzes (7 of 8 quizzes, 10 pts each)	70	10%
Weekly Lab Book Check (10 checks, 5 pts each)	50	5%
Lab Book Midterm Grading	100	35%
Lab Book Final Grading	100	35%
	Total:	100%

Grading Procedures

No extra credit work is offered. Letter grades: 95% and above will be an A, 90-95% will be an A-, 87-90% will be a B+, 83-87% will be a B, 80-82% will be a B-, etc. Take quizzes and come to lab, answer questions in your lab book, help others and have them help you earn an A.

Late work

Quizzes cannot be taken late. Students interviewing for graduate/medical/dental school are responsible for taking online quizzes before the quiz due date and should plan accordingly to avoid getting a zero.

Midterm Lab books are due at the end of the lab period in which they are due. Final lab books are due by noon on the due date and may be turned in during class or by sliding underneath Dr. Hope's office door. Lab books turned in late will be deducted 10 points of the 100 points possible for being late the day they are due and will be deducted an additional 15 points for being turned in the day after they are due (total of 25 points deducted from 100 possible points), and will not be accepted beyond the day after the due date without a valid, university-approved excuse.

Excused Absences

Each student is responsible for all required lab book entries and lab book questions for a missed lab. To avoid losing attendance points, you must also provide appropriate evidence for your absence. A valid excused absence prevents getting attendance points docked. Approved excuses include illness or accident, unusual stressful circumstances that prevent you from attending, or medical/dental school interviews where you will not be in town. More than one absence may require make-up lab work with a TA to perform any for missed lab skills. Please talk to Dr. Hope if you anticipate or experience an absence.

Exams

There are no exams for this laboratory course.

Assignment Descriptions

Quizzes

Online reading quizzes are taken on Learning Suite due before class begins. The quizzes test your knowledge of the instructions for the upcoming experiments as well as on concepts from previous lab experiments. Be sure to read your assigned lab manual pages before you take the quiz.

Complete the quiz on your own.
Each quiz is worth 10 points.
Quizzes are OPEN book, OPEN notes.
Quizzes have a 15 minute time-limit, but will probably only take you 5-10 minutes to complete.

If you have Learning Suite, computer, or internet issues that interfere with taking a quiz, please call 801-422-4000 and ask for help, or email the TA or Dr. Hope. Your lowest quiz score will be dropped.

Lab Book

Students are expected to keep a lab book throughout the semester. Lab books account for 70% of your semester grade, so you should take lab book bookkeeping seriously. Your lab book will be fully graded at Midterm and at the end of the semester. In the lab book, you are required to include the typed protocol and identify any variations taken while following the protocol during lab class. You are required to write

out all results and/or include results as printouts in your lab book. You are also required to answer specific questions about each experiment as defined in the lab manual. Lab books are to be written in 'real time'; which means that the lab book should always be current with all information required for each experiment. The **Weekly Lab Book Check** will ensure that all lab books are kept current. Each week of a lab book check, the TA will observe the lab books of each student to determine whether the book is current. The TA will not grade for content at the time of a lab book check. The student will receive 5 points for having completed all writing for the previous week and entered in preliminary information for the day's lab. The 5 points for a lab book check are received as an **all-or-none grade**. If the book is not current for the previous week or does not yet have some form of the current day's protocol, the student will receive a zero (0) for the lab book check for that day.

The score for the lab book at **Midterm and Final Grading** will be based on how well you follow proper lab book recording rules as well as the protocol, results and answered questions for each experiment. Proper lab book recording rules are described in the lab manual and the grading sheets for Midterm and Final grading are located in the Appendix of the lab manual. The grading sheet has point values broken into categories. Be aware that it is possible to lose all points for a category by failing to meet just one of the criteria in the category (i.e. you can lose all 16 of the formatting points for not following the requirement of '**Legible Writing'** even if you followed all of the other formatting requirements). Answers to lab manual questions should be included in the lab book and should be easily identifiable for grading purposes. For full credit, answers to questions should also be thorough. For instance, you will lose points for doing the following: Question: Explain why the positive and negative controls are needed.

Poor Answer: They are used to see if the assay is run properly and the results are reliable.

Course Policies

Attendance

Attendance at each laboratory period is mandatory for credit. You will receive 90 points for perfect attendance. Thirty (30) points will be deducted from your lab attendance score for any unexcused absence (which means that you receive a zero (0) for lab attendance points if you have three unexcused absences). If you must miss a class period for a valid reason, you can get this attendance deduction waived. Excused absences must be legitimate and validated. See "Excused Absences" above.

Tardiness & Lab Clean-up

You are expected to arrive to class on time. If you are later than 5 minutes to class without an appropriate reason, you will have five points deducted from your attendance. You may lose up to 65 lab attendance points should you make tardiness a habit. You are expected to clean your lab space after experimentation**. If your lab space requires further cleaning after you leave**, each member of your group will receive **up to 10 points deducted from attendance** points. You may lose your entire 90 lab attendance points if you make messiness a habit. By coming to class each week on time and cleaning your space at the end of lab you can expect to retain all of your attendance points.

Computers

One or more of your team members must bring a Windows-compatible laptop to class on scheduled days. During some class periods, you will be required to print data to put in your lab book, which must be included by the following week for the lab book check. You may send a print job to one of the LSB printers if you are connected or you will need to print outside of class.

Course Schedule

Date	Quiz	Check	Reading	Lab Topic
Sept. 3			Lab 1	Lab Safety Training, Basic Lab Skills, Experimental Design, Prepare Lab Book
10	1	√	Lab 2	Mouse Handling, Dissection and Tissue processing
17	2	√	Lab 3	WBC Isolation, slide preparation & staining
24	3	√	Lab 4	Sterile technique, cell counts, microscopy
Oct. 1	4	√	Lab 5	Methylcellulose Cultures of Bone Marrow
8	5	√	Lab 6	Culture colony identification, harvest, cytospin, microscopy
15	6		Lab 7	Flow Cytometry Intro – Meet in Room 2018 LSB for data analysis **Midterm Grading Lab Books due at class end** (pgs.1-87= thru Experiment 2)
22	7	√	Lab 8	Phagocytosis, Blood TBNK staining, Flow Data Analysis
29		√	Lab 9	Microscopy & Flow Data Analysis
Nov. 5	8	√	Lab 10	Antibody Staining of T cells in Spleen & Thymus from mice
12		√	Lab 11	Flow data analysis
19		√	Lab 12	Flow Cytometry sorting, data analysis and lab book work
26				NO LAB THANKSGIVING WEEK
Dec. 3				Finishing lab books for final grading, wrap up info. Lab books may be handed in.
10				**Lab Books due by the end of class for Final Grading** -- No Final Exam--

The instructor reserves the right to change the Course Schedule depending on the students' needs or course delays.

Influenza/COVID Illness Policy
Students who have flu-like illness should stay away from others for at least 24 hours after their fever is gone except to get medical care or for other necessities. Your fever should be gone without the use of a fever-reducing medicine, such as Tylenol, before returning.

Academic Honesty
Please do your own work. Avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct.

Honor Code
Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards.

Plagiarism
Writing submitted for credit at BYU must consist of the student's own ideas presented in sentences and paragraphs of his or her own construction. The work of other writers or speakers may be included when appropriate (as in a research paper or book review), but such material must support the student's own work (not substitute for it) and must be clearly identified by appropriate introduction and punctuation and by footnoting or other standard referencing. Use of AI for writing should be indicated for any section where AI was used in your lab writeup.

Preventing Sexual Harassment
Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the university, but to students as well. If you encounter unlawful sexual harassment or gender-based discrimination, please talk to your professor; contact the Equal Employment Office at 422-5895 or 367-5689 (24-hours); or contact the Honor Code Office at 422-2847.

Students with Disabilities
If you have any disability which may impair your ability to complete this course successfully, please contact the BYU Accessibility Office (422-2767). Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. Services are coordinated with the student and instructor by the UAC center.

Use of Technology in the Classroom
Technology is an essential part of today's learning environment. However, when used inappropriately, technology can hinder learning. The class may decide to connect a digital player to the classroom speakers for music during lab, but the music must be muted when the instructor or TA is delivering instructions. If the music is a distraction to you such that learning is hindered, please let the instructor or TA know and the music will be discontinued. If the music is discontinued for any reason, please be respectful to the person or persons who have made the request.

Devotional and Forum Attendance
As Elder Dallin H. Oaks stated, "You neglect your education and fail to use a unique resource of this university if you miss a single one" (from the address *Challenges for the Year Ahead*, 6 September, 1973). Your attendance at each forum and devotional is strongly encouraged.

BYU's Statement on Belonging
We are united by our common primary identity as children of God (Acts 17:29; Psalm 82:6) and our commitment to the truths of the restored gospel of Jesus Christ (BYU Mission Statement). We strive to create a community of belonging composed of students, faculty, and staff whose hearts are knit together in love (Mosiah 18:21) where:

- All relationships reflect devout love of God and a loving, genuine concern for the welfare of our neighbor (BYU Mission Statement);
- We value and embrace the variety of individual characteristics, life experiences and circumstances, perspectives, talents, and gifts of each member of the community and the richness and strength they bring to our community (1 Corinthians 12:12–27);
- Our interactions create and support an environment of belonging (Ephesians 2:19); and
- The full realization of each student's divine potential is our central focus (BYU Mission Statement).