

**BIOB 411 IMMUNOLOGY LABORATORY**

Autumn Semester, 2016

Dr. Scott Wetzel (CHCB 216; Phone 243-2168)

Lab schedule: 1:10 - 4:00 pm on Mondays in HS 404

Teaching Assistant: Jim Reed (CHCB 215; Phone 243-2168)

Date	Lab #	Page	Topic
<b>August</b>			
29	1	1	Introduction - grading, animal use, safety, etc.
<b>September</b>			
5	-		HOLIDAY
12	2	6	Cells and organs of the immune system- PART 1
19	3	12	Cells and organs of the immune system- PART 2
26	4	18	Generating polyclonal antibodies- PART 1
<b>October</b>			
3	5	20	Immunoagglutination assays
10	6	24	Immunoprecipitation and Electrophoresis
17	7	35	Complement fixation assay
22	8	38	Western Blot, SDS-PAGE
31	9	-	<b>MIDTERM EXAM</b>
<b>November</b>			
7	10	41	Passive hemagglutination & Generating polyclonal antibodies – PART 2
14	11	45	Immunofluorescence microscopy
21	12	51	Flow Cytometry ----- <b>LAB PAPER OUTLINE DUE</b>
28	13	54	ELISA
<b>December</b>			
5	14	60	Generating polyclonal antibodies- PART 3
12	15	63	Complete analysis of antisera, compile data and Lab Paper
16	-		<b>FINAL EXAM (1:10 to 3:10)</b>
16	-		<b>LAB PAPER &amp; NOTEBOOKS DUE by 5:00 PM</b>

***GENERAL NOTES:***

**GRADING-** BIOB 411 points are broken down as follows: 200 pts from 2 lab exams (midterm and final), 100 pts from a formal lab report (see below), 70 pts from the lab notebook (5 pts per lab) and 30 points from quizzes. Grades are calculated by 90%, 80%, 70%, and 60% of the total points; which represent the cutoffs for an A, B, C, and D, respectively. Materials turned in late will be reduced by 10% of the total points per day of tardiness. ***Students missing more than two labs will be required to drop the course.***

**QUIZZES:** These are long, and frequently complex laboratory exercises. You **MUST** read the material and prepare for each lab **AHEAD** of time (remember this is a 2 credit course). To insure that you come prepared, we will have unannounced quizzes at the beginning of 6 of the first 12 labs during the semester. These quizzes will be worth 5 points and will cover the lab that day.

**LAB PAPER-** Each team will receive a mouse for generating "monospecific" polyclonal antiserum. The protocol and results obtained from this portion of the laboratory (labs 4, 10, 13 & 14) will be summarized by each student in a typewritten report. The report format will follow the publication style as set forth by the *Journal of Immunology* (for details see Laboratories 13 & 14). **Late papers WILL LOSE 1 LETTER GRADE PER DAY and WILL NOT BE ACCEPTED AFTER December 16.**

**LAB NOTEBOOK-** Each student will maintain a personal and comprehensive lab notebook. Loose-leaf paper is **NOT** acceptable. Record your data and observations **IN PEN** for future reference. Be sure and take your notes **DURING** the lab. Evidence of post-lab entry of observations will lower your grade. Please note that lab notebooks will be picked up periodically during the semester for grading by the TA. **Late notebooks WILL LOSE 1 LETTER GRADE PER DAY and WILL NOT BE ACCEPTED AFTER December 19.**

### **LABORATORY NOTEBOOK REQUIREMENTS:**

Each experiment in your lab notebook needs to be fully documented and should read like a formal lab paper. These are the required items and their point values for each week's lab period:

#### **Table of Contents**

Example:

Table of Contents	
Lab 2 – Cells and Organs of the Immune System I	page 3
Lab 3 – Cells and Organs of the Immune System II	page 7
etc.	

**In your lab notebook you must have these sections:**

**Introduction – (1pt)** – a couple of sentences/paragraphs describing what the lab will cover.

**Procedure – (1pt)**

Example:

BIOB 411, Immunology Lab, Professor Wetzel, Fall 2011, University of Montana, pages 11-12

**\*\*Note any deviations from lab manual procedure\*\***

**Results – (1pt)** – Numbers, drawings, etc. This is a description of your data and includes any calculations of % difference, etc. that isn't in your figures.

**Discussion/Conclusion – (1pt)** – What was expected and what did it mean? Did everything turn out as expected? Was there error? Why did the error occur? Observations, Ideas, Thoughts, Etc.

**Take Home Problems - (1pt)** – These will be on the chalkboard.

### **GENERAL INFO: KEEPING A LABORATORY NOTEBOOK**

All students will be **required** to maintain a laboratory notebook. The notebook will be used for the recording of laboratory data and calculations, and will be critically important for writing your lab paper. It will also be periodically picked up and graded.

The purpose of a laboratory notebook is to allow anyone with some knowledge to understand **exactly** what you did. You need to record the information in sufficient detail so as to be able to repeat it, and you must be able to understand exactly what your results were. You will need good notes to be able to write your lab reports; in addition, your notebook may allow you to figure out why some parts of your experiments did not work as expected.

Companies that perform research require their employees to keep proper notebooks. In these companies, company policy dictates that any work not recorded in the notebook was never actually performed. As a result, the work must be repeated, which tends to have deleterious effects on the career opportunities of the employees involved. In cases of disputes as to priority, notebook dates are sometimes used to indicate exactly when an experiment was performed. Ownership of patents (and in some cases large amounts of money) can therefore be critically dependent on keeping a proper notebook. Instruction in keeping laboratory notebooks is therefore a major part of most laboratory courses.

In your notebook, each experiment should begin with a **title**, a **date**, and a statement of the **objective(s)** of the planned work. In other words, an introduction. You should also **record exactly what you did at each step** (being sure to mention anything that you did that differed from the information in the Manual). In addition, you should record any numerical information, such as the weights of reagents used, absorbance readings, protein concentrations, and buffer concentrations.

**Everything** you do should be recorded **directly** into your lab notebook in **pen**. If you make a mistake, draw a line through it, and write the correction next to the mistake. (It may turn out that the original information was correct after all, so do not obliterate the original information by erasing it, or by removing the page from your notebook.) Any calculations performed should be written directly into your book. Hard copies of work done on a computer and printouts from laboratory instruments should be taped directly into your lab notebook.

Writing important information on scrap paper, and then recording it in your notebook later is **not** acceptable. **If you are writing something while in the laboratory, you should be writing it directly into your notebook.**

At each step in your experiment, in addition to the results, record your thoughts regarding the experiment and how you think it is going. Record your mistakes, and your attempts to rectify them. Record the calculations involved in any type of data analysis, as well as explanations for both what you did and what you think it means. A research project is a journey into the unknown; your laboratory notebook is usually your only guide through the forests of uncertainty.

It is also a good idea to look over your notebook periodically during the semester, and make notes of things that you do not understand, so that you can ask questions before the lab reports are due.

Do not say “well, I will remember what this means”; instead, **write it down!** Do not say “I will remember what I was thinking while I did this experiment”; instead, **write it down!** If you use your lab notebook properly, you will find that writing your lab reports is much easier, and you will be developing good habits for the future.

**FINAL LAB PAPER GUIDELINES:**

**OUTLINE OF LAB PAPER-** Provide an outline of your lab paper to the TA by the due date on page 1 (November 19). Describe your ideas for presenting the data and how you will arrange the results in the context of the format below.

**LAB PAPER-** The final paper will be typed and double-spaced. The paper is worth ~ 30% of your lab grade. The style of the report follows the format of the *Journal of Immunology* (<http://www.jimmunol.org/site/misc/authorinstructions.xhtml#generalguide> instructions for full-length articles). It is STRONGLY recommended that you read through these directions before writing your paper. The requirements include:

- ❖ Title Page- Title, name(s), address(es), key words
- ❖ Abstract- A summary of your data (250 words maximum)
- ❖ Introduction- the background and justification for your research
- ❖ Materials and methods- a reiteration (in your own words) of the labs
- ❖ Results- tabulated and graphic data as well as text description. This is a description of your data and includes any calculations of % difference, etc. that isn't in your figures. Make sure you reference your figures.
- ❖ Discussion- below
- ❖ References- Not required for the report, but If you use a reference other than the lab book you MUST provide a reference. (otherwise this will be plagiarism)

**GRADING OF THE PAPER IS AS FOLLOWS:**

**Journal of Immunology format and 5-page limit----** 10 pts (*only the first 5 pages will be graded*)

**Results---**quality and data presentation---30 pts

**Discussion----** 40 pts. Explain what you might have expected and if your results meet those expectations. Tell the significance of the results. Propose future experiments, etc.

**Content---**20 pts. Grammar, spelling, etc. (this is a writing course); reflects the presentation and style.