

# BS 171: Cell and Molecular Biology Laboratory

## Fall Semester, 2016

### Course Syllabus

#### Course Coordinator

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#### ***What would a biologist do?***

**That is the theme upon which BS171 exercises and content are based. The design of the BS171 laboratory course is to try to recreate, as best we can in our classroom setting, a true research laboratory experience.** All known biological information was acquired through observation and experimentation. Biologists in the laboratory or in the field make observations of biological phenomena and, based on those observations, pose questions, formulate hypotheses and then design and carry out experiments to address those questions and test their hypotheses. They keep records of their results (the laboratory notebook) and have to analyze and interpret their data and then their findings and conclusions need to be reported to the scientific community (and society in general).

The faculty has designed the BS171 *exercise modules* to mimic this process as best we can in a classroom setting. Rather than mindless “cookbook-like” lab exercises where you simply follow a set of instructions (recipes) and go home (which may be your experience in laboratory classes thus far), *BS171 exercise modules are couched within the framework of using the Scientific Method*. We are going to ask you to be creative and to think for yourselves.

Students are first introduced to a set of laboratory techniques and relevant background science and then, armed with these research tools, asked to use their knowledge creatively. Students are allowed to formulate legitimate biological questions and hypotheses on topics that interest them and then design and carry out their own experiments to test their hypotheses. After proper analysis of their data, students then “report” their findings in the same ways that professional biologists report their research; through lab notebooks, lab reports and, ultimately research posters. The goal is that students not only learn biological facts and principles but also how to solve problems and to think critically, to learn to apply their knowledge and analyze observations and new phenomena based upon their knowledge—in other words, *to begin your training as actual scientists*.

There are a number of basic course goals that go hand-in-hand with this overall course design and served as the foundation for designing BS171 exercises and assignments:

- *To provide students the opportunity to practice how biological knowledge is gained through the Scientific Method*
- *To develop critical thinking and problem solving skills*
- *To teach fundamental lab techniques*
- *To introduce students to basic molecular methods and their practical applications*
- *To highlight the cellular processes associated with these molecular methods*
- *To develop communication skills*
- *To familiarize students with sources of scientific literature, biological information and on-line databases*
- *To integrate mathematics as applied to biological problems*
- *To simply prepare students for upper level courses*
- *To make the teaching laboratory as similar to a real research laboratory as possible*
- *To generate enthusiasm for biology (Biology is fascinating and fun!!!!)*

### “Week 1” BS171 Schedule

MSU’s “*Through the Looking Glass*” Week 1 can be confusing. Whatever your schedule for your other classes, the BS171 schedule is as follows:

***Labs that normally meet on Mondays will meet on Wednesday, August 31.***

***ALL other BS171 sessions*** (ALL other labs and ALL recitations) follow their normal daily schedule the *following* calendar week (Sept 6-9).

August-September						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31 Attend lab if your lab is normally on Monday	1 No 171 classes	2 No 171 classes	3
4	5 Labor Day University Holiday	6 Attend your normal Tuesday recitation or lab	7 Attend your normal Wednesday recitation or lab	8 Attend your normal Thursday recitation or lab	9 Attend your normal Friday recitation	10

### Course Materials and Resources

**Course Website:** We will be using D2L (<https://d2l.msu.edu>) for our course website.

The general, course-wide D2L site will be administered by Dr. Urbance and will contain announcements and a general course information folder in the “Content Browser” section, containing lab exercises, syllabus, rubrics, etc. Each graduate teaching assistant will have a folder for his/her sections, also in the LESSONS section of the site, where they will post section-specific materials

## Textbooks and Required Materials

1. The laboratory exercise manual and associated documents will be made available on-line on the course D2L site.
2. **Student Lab Notebook**, Hayden-McNeil Publishing, is mandatory and available from the student bookstores.
3. **Students need Logger Pro software to run some of their experiments.** This is a free download and be obtained as follows:

### LOGGER PRO DOWNLOADS

Windows 10, 8, 7

Logger Pro 3.11 with sample movies (Windows)

Link: <http://www.vernier.com/d/toz10>

Password: exploration

Mac OS X 10.11, 10.10, 10.9, 10.8

Logger Pro 3.11 with sample movies (Mac OS X)

Link: <http://www.vernier.com/d/q8grj>

Password: exploration

Detailed Instructions: For more details on how to download and install Logger Pro, see:

<http://www.vernier.com/til/2069/>

4. There will be a cost to the student (<\$20) toward the cost of printing their group research poster. *This is a requirement of the course and failure to contribute toward your team's poster will result in the student failing that assignment.*
5. Students are responsible for supplying their chosen research specimens. These can come from nature but the financial burden is on the student team if samples need to be purchased.
6. It is *recommended* that you have access to your BS161 textbook to augment background knowledge on the topics covered in the laboratory.

**On-Line Lectures:** Much of the underlying concepts and background science behind the lab exercises in this course will be presented as online lectures available on the course D2L website. These will be openable using your web browser. *Some* are formatted as Shockwave Flash files (.swf). If your browser is not currently capable of playing .swf files you will need to get Adobe Macromedia Flash Player. This is a free download available at <https://get.adobe.com/flashplayer>

**Recitations:** *Attendance in recitation is considered mandatory and chronic absences and tardiness will result in loss of effort points and points for any in-class assignments.* Recitations will cover material related to the labs and readings, will go into greater detail and emphasize specific points and will include in-class exercises and assignments. Frequently students will be expected to present their data and data analyses to the class.

**Making up a missed class:** *Missed labs and recitations, and any points associated with them, can only be made up by prior arrangement, for a documented illness, or for a legitimate (assessed by Dr. Urbance) emergency.* If you do **miss a lab or recitation and a makeup is granted, you must contact** your lab instructor to determine if you can go to his or her other section, or some other section that week. If a student needs to make-up the session in another instructor's section, **it is the student's responsibility to contact the appropriate lab instructor to get permission to attend that lab or recitation. BOTH the student's TA and the TA of the section you are wishing to attend must be informed of and agree to the student attending the make-up section.** An instructor has the right to deny admittance to any student wishing to attend that section without prior arrangement.

**BioSci Help Room:** 219 North Kedzie Laboratory is the BioSci help room that will be manned by the TA's at scheduled times each week. A detailed Help Room hours schedule will be posted on D2L and outside the room.

**E-Mail Expectations:** Michigan State University's e-mail system will be used in this course. You should be sure to activate your free account before the end of the first day of classes. We will send out information about the lab or recitation via e-mail. We also recommend that you contact your laboratory or recitation instructor with any questions pertaining to lab or recitation via E-mail. YOUR MSU EMAIL ACCOUNT IS IMPORTANT. I know many of you use alternate email accounts, however, all class related announcements and work will be sent to your MSU account. **You are responsible for any course information sent to your MSU email account so check your MSU account frequently.**

**Disability Accommodations:** Requests may be made by calling Sonya Lawrence at (517) 432-1316.

**Attendance:** Attendance at all assigned labs and recitations *is mandatory*. Scheduled absences for legitimate (as determined by Dr. Urbance) reasons must be requested and approved *well in advance*. We realize that emergencies do occur. Classes can be made-up in the event of a *documented* illness or emergency. See Dr. Urbance about acceptable absences and proper documentation.

While you have our sympathies, excuses such as "My car broke down", "I over slept because I've been studying for four exams this week" are *not* legitimate excuses for missing class. (Sorry)

### **Late Assignments, Missed Assignments and Regrading Policy:**

***Late assignments will be penalized 10% for every day (including each weekend day) that they are late and will not be accepted after one week past the due date.*** If you need to hand in an assignment late, or *even think* you may need to hand in an assignment late, see your instructor *before* the assignment is due. If you turn in an assignment over the weekend you must submit an electronic version to receive the proper late penalty, otherwise it will be penalized as based on a Monday morning submission.

You MUST contact your lab instructor to determine if and how you can make up any missed assignments. All make-ups must be completed *within one week* of the absence. Permission to make-up a missed assignment is ***at the discretion of the instructor after consultation with Dr. Urbance.*** If you miss the LCE exam, then you must contact Dr. Urbance about rescheduling the test or taking a make-up test *and turning in your verification* for the absence.

***Any questions or challenges about scoring or score changes must be completed within two weeks after the graded assignment was returned.*** No score modifications will be made after that point. Dr. Urbance has final say on any scoring arbitration.

**Laboratory Safety:** In any laboratory setting, safety is a prime consideration. Potential hazardous chemicals and equipment may be used in the lab. It is critical that the lab is maintained in a safe and organized fashion at all times. Be aware of the safety features of the lab that your instructor will describe. ***You are also required to wear protective eyewear whenever performing experiments in these labs.*** Please discuss any special concerns (contact lenses, pregnancy or other conditions) with the lab instructor or course coordinator as soon as possible. Rolling in-line skates and open-toed shoes are not allowed in the lab room. Failure to comply with course guidelines and policies established during the semester may affect your final lab grade. **Intentional damage of laboratory equipment, materials, supplies or anything we provide, may result in a grade of 0 for participation, an assignment or for the final grade.** If you lose an item in the lab, you can come to 218 NKL to see if we have found it.

**Protective Eye Wear:** ***In this course, you are required to wear safety glasses to protect you whenever you are pipetting in the lab.*** If you have safety glasses which you used in your chemistry lab, then you can also use these same safety glasses for this course. If you do not have glasses, then you must purchase a pair from MSU Stores on Service Road (south campus) or elsewhere.

### **Honor, Cheating, and the University Policy on Dishonesty:**

We expect honors biology students to embrace the Spartan Honor Pledge ([honorcode.msu.edu](http://honorcode.msu.edu)),

"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Some laboratory exercises will involve your working within a group and for several of these group exercises you may write homework assignments as a group effort. However, there are selected written assignments where you **must** show individual thought and you will be penalized greatly for work that too closely resembles that of another student. Honesty is an important component of academia and this honors course. I intend to follow the all-university rules governing dishonesty as described at: <https://www.msu.edu/unit/ombud/academic-integrity/index.html>

Examples of academic dishonesty include (but are not limited to):

- Fabricating or falsifying data on an assignment or project
- Claiming (or implying) that the work of others is your own—that is, copying another student’s work or using the published written work (this includes internet resources) without proper citation.
- Helping someone else be academically dishonest by providing them your homework answers, exam or quiz questions, papers, etc.

According to the University’s Policy on Dishonesty, penalties for academic dishonesty may include giving the student a failing grade (or a penalty grade) on the assignment or even a failing grade for the course. If the instructor feels that additional actions are justified, then he/she may report the case to departmental director or the college dean and the matter may be brought before a college-level hearing board for further disciplinary action.

My point is: don’t cheat because it’s just not worth it. It is far better for you to submit your own work—whether it is wrong, late, or incomplete—than it is to fabricate, copy, or plagiarize. Any student violating the conditions described above may face academic disciplinary sanctions.

### Who to Contact and When

Reason	Contact Information	Contact Person
You missed a lab and want to make up the lab or turn in the lab paper late or make up a test.	See email addresses of the instructors	Your instructor and the instructor of the section you wish to attend for the make-up
You need help with the lab content, an assignment or a paper.	See email addresses of the instructors	Dr. Urbance, your instructor or visit the help room (219 NKL)
Administrative details (e.g., drops, adds, section changes, and related matters)	432 - 1316 smithsh@msu.edu	Ms. Shelly Smith 218 North Kedzie Laboratory BioSci Program Secretary
You need to talk to someone about a problem with the lab or the recitation or an unresolved situation with your lab instructor.	432 - 1316 urbance@msu.edu lawren48@msu.edu	Dr. Urbance or Claire Moore

**Questions or Concerns:** If you have a problem or question concerning the laboratory, see your lab instructor first. If the problem cannot be resolved by your lab instructor, then contact the course coordinators, Dr. Urbance or Sonya Lawrence. If you are unable to resolve the problem, then contact the Biological Sciences Program Director, Dr. John Merrill at 432 - 1316 (appointments are made through the program secretary) or merrill3@msu.edu.

**BS171 Fall 2016 Grade Determination:** Point values for the various assignments will be distributed as per the following distribution categories.

ASSIGNMENT	Overall %
<b>Lab Notebooks</b> <i>Lab Planning Portion</i> <i>Data Collection &amp; Analysis Portion</i>	<b>20%</b>
<b>Quizzes and Exams</b> <i>In-lab Quizzes</i> <i>Lab Skills Practicals</i> <i>Cumulative Knowledge Exam</i>	<b>33%</b>
<b>Student-designed Research</b> <i>Biomolecules Pepper Experimental Design</i> <i>Biomolecules Research Proposal</i> <i>Biomolecules Investigation, Group Poster</i> <i>DNA Research</i>	<b>25%</b>
<b>Recitation Assignments &amp; Homeworks</b> <i>These will be assigned as we go through the semester.</i>	<b>17%</b>
<b>Individual Effort &amp; Class Participation</b>	<b>5%</b>
<b>Total</b>	<b>100%</b>

Individual assignment scores will not be posted online by your instructors. *It is the student's responsibility to keep track of their point totals and progress in this course.*

### Grading Scale

Percentage	Grade
90-100%	4.0
85-89.99%	3.5
80-84.99%	3.0
75-79.99%	2.5
70-74.99%	2.0
65-69.99%	1.5
60-64.99%	1.0
59.99% or less	0.0

**BS171 Laboratory Schedule, Fall 2016 (subject to amendment)**

<b>Dates</b>	<b>Lab Topic/Exercise</b>	<b>Associated Assignments*</b>
Week 1 † Aug. 31- Sept. 9	Laboratory Safety Training Fundamental Laboratory Methods & Techniques <i>Includes pipetting and spectrophotometry</i>	<i>Bring your notebooks and laptops with Logger Pro software</i>
Week of Sept. 12-16	Biological Molecules (Proteins) <i>Protein Fingerprinting (SDS-PAGE electrophoresis)</i> <i>Bradford's Test</i> <i>Biuret Test</i>	<i>In-Lab Quiz</i> <i>Lab Planning Assignment</i>
Week of Sept. 19-23	Biological Molecules (Carbs & Fats) (Spectrophotometry) <i>Iodine Test</i> <i>Sudan III Test</i> <i>Benedict's Test (qualitative &amp; quantitative)</i>	<i>In-Lab Quiz</i> <i>Lab Planning Assignment</i>
Week of Sept. 26-30	Biological Molecules (Enzymes and enzyme activity)	<i>Lab Planning Assignment</i>
Week of Oct. 3-7	Biological Molecules (Experimental design)	<i>Research Proposal</i>
Week of Oct. 10-14	Biological Molecules (Independent Research)	<i>Lab Planning Assignment</i>
Week of Oct. 17-21	Biological Molecules (Independent Research)	<i>Lab Planning Assignment</i>
Week of Oct. 24-28	In-class poster prep	
Week of Oct. 31- Nov. 4	DNA Exercise	<i>In-Lab Quiz</i> <i>Lab Planning Assignment</i>
Week of Nov. 7-11	DNA Exercise	<i>In-Lab Quiz§</i> <i>Lab Planning Assignment</i>
Week of Nov. 14-18	DNA Exercise	<i>In-Lab Quiz§</i> <i>Lab Planning Assignment</i>
Week of Nov. 21-25	THANKSGIVING WEEK!!	No BS171 Classes!!!
Week of Nov. 28- Dec 2	DNA Exercise	<i>In-Lab Quiz§</i> <i>Lab Planning Assignment</i>
Week of Dec. 5-9	DNA Exercise	<i>Cumulative Knowledge Exam</i> <i>in Recitation</i>
Finals Wk. Dec. 12-16	No Final Exam (Good Luck on your other finals)	

† Encompasses the start of classes through the Labor Day calendar week (take aspirin as necessary!)

§ Tentative quizzes. Some of these may be dropped or the dates changed. Changes will be announced.

\* Not all assignments are listed in this schedule.