BIOL 322– Cell and Molecular Biology Laboratory

Instructor: Mrs. Naomi Rowland and your assigned TA
Office: Office hours are by appointment or see me after class
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Course Description: This course will be a dynamic inquiry-based course that is designed to teach you how to use the scientific method, essential laboratory techniques and skills, how to conduct your self in a professional laboratory setting and give you the opportunity to contribute real data to two large national research projects. The first one is a study of the bacterial endoparasite of arthropods called *Wolbachia* that we will use to learn molecular biology techniques such as DNA isolation, PCR and gel electrophoresis. The second project is a study using *Tetrahymena*, a common fresh water ciliate to study properties of living cells. Each week your experiments will build on the previous week. At the end you will present your findings in a professional scientific poster.

Student Learning Objectives:

1. Master pipetting correctly and accurately.
2. Learn essential laboratory techniques such as making solutions, aseptic technique and others.
3. Investigate scientific literature.
4. Use the scientific method to write lab report
5. Collect data and present a scientific poster presentation.
6. Perform modern molecular biology skills such as DNA isolation, PCR, gel electrophoresis.
7. Master basic cell biology laboratory techniques such as microscopy, handling cultures, staining cells.

Text: None required. Material will be supplied to you on Blackboard. You are expected to login to Blackboard at least weekly.

Other requirements:

- You will need a lab coat, we do have some in the lab that you can purchase for $5 or you are welcome to buy your own. You must have it by the second class meeting. Green River Scrubs is a good place to go on Chestnut Street as they have a variety of sizes and offer 20% discount to students.
- You will also need a lab notebook, (bound, not spiral) and a black Sharpie marker by the second class meeting. You may find it useful to have both a thick and thin sharpie and also multiple colors can be very helpful in this class but those are not required.
- Closed toe shoes (no flipflops), full shirts (no crop tops), shorts or pants to the knee are required. Long hair must be pulled back in a fixed closure, tossing it back continually is not acceptable. Scarves, head dresses and necklaces need to be tucked into the lab coat for your safety. Failure to come appropriately dressed will result in your dismissal for that day and loss of participation points.

- Cell phones, backpacks, purses, food and drinks will be kept in cubbies outside of the classroom.
- Attendance is a requirement, see next section below.

Attendance: **Attendance in this class is extremely important**. Attendance at the first class meeting is mandatory. Anyone who is not present on the first day will be dropped from the course. Attendance at each class period is also mandatory. Points will be subtracted from your participation grade for being late, leaving early or being absent, even with a valid documented excuse because you did not physically do the lab. The % of class missed will be deducted from the participation grade.
Management of "class time" is essential for this class for several reasons. Each lab builds on the previous class. We are only scheduled for 2 hours a week but some weeks we have more than 2 hours of work. Therefore, it is essential that you come to class ready to work, do not arrive late and most importantly do not miss labs. Please consider this when making your schedule. You will not be excused for being late because you scheduled another class at south campus too close to this one.
Labs cannot be made up however with real documentation, a full 4 page lab report can be written for participation points, a maximum of 2 per semester. Lab reports are due within one week of the original lab. No lab report will be accepted without official documentation. If you need to miss more than 2 labs, you should consider dropping the course. In addition, due to the nature of this course, each unexcused absence or any absence over 2 regardless of documentation will drop your final grade by 10 points. You can not attend another section of a lab as we can only have 18 students in each lab for safety reasons and all sections are full.
Please note, all correspondence will be via official WKU email, I cannot honor verbal agreements made between a TA and a student. Please email me any documentation necessary.

Assignments: No late assignments are accepted. Our class Blackboard site will have all the information you need for each week of lab. **You are required to review this information prior to attending class**. Each week there will be a pre-lab quiz over this material. The quiz will disappear at class time so you will not be able to make-up this quiz, even if you have a documented excuse. It is essential you come to class prepared, it is essential that you read all protocols and watch any videos posted prior to entering the classroom. This is a matter of safety and efficiency. Not coming prepared will delay your experiments and directly result in more of your time being spent outside of class doing your work.

Assessment: Students will be assessed using assignments and examinations with the following approximate points, however this WILL change slightly. Extra credit is built into the course, so it is very advantageous to you to do all small assignments. This will substantially help your grade. **Due to this, I will not give extra credit at the end of the semester as the "extra credit" is built into the course.**

Participation	11 x 5pts = 55pts
Weekly Prelab quizzes	11 x 5pts = 55pts

Mid term	1 x 50 pts = 50pts
Lab Notebook	2 x 50 pts. = 100pts
Final poster presentation	1 x 100pts = 150pts
Final exam	1 x 100pts = 100 pts
Approximate Total Points	= 460 pts.

Total possible points will be added and grades determined according to the standard scale. Grades will be reported as you have earned. I only report what is earned by the student, I do not "give" you a grade. **According to this scale, an 89% is a B and a 79% is a C and a 69% is a D.**

A = 90-100%	D = 60-69%
B = 80-89%	F = < 60%
C = 70-79%	

Plagiarism: Using someone else's written work for course assignments and/or copying from any internet site is plagiarism. Plagiarism is a serious offense. The academic work of students must be their own. Students must give the author(s) credit for any source material used. To lift content directly from a source without giving credit is a flagrant act. To present a borrowed passage after having changed a few words, even if the source is cited, is also plagiarism. *(*From WKU Student and Faculty Handbook*)* WKU subscribes to sources in which an instructor can check to see if something is plagiarized. If this is found to be the case, the assignment will be assigned 0 points. No second attempt will be allowed. After more than one offense, you will fail the course.

Cheating: No student shall receive or give assistance not authorized by the instructor in taking an examination or in the preparation of an essay, laboratory report, problem assignment, or other project that is submitted for purposes of grade determination. *Disposition of Offenses - Students who commit any act of academic dishonesty may receive from the instructor a failing grade in that portion of the course work in which the act is detected or a failing grade in the course without possibility of withdrawal. The faculty member may also present the case to the University Disciplinary Committee through the Office of the Dean of Student Life for disciplinary sanctions. Students who believe a faculty member has dealt unfairly with them in a situation involving alleged academic dishonesty may seek relief through the Student Complaint Procedure. *(From WKU Faculty Handbook)**

Student Accessibility Resource Center (formerly Student Disability Services): In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at sarc.connect@wku.edu. Please do not request accommodations directly from the professor or instructor without a Faculty Notification Letter (FNL) from The Student Accessibility Resource Center.

Title IX Discrimination, Harassment and Sexual Misconduct Policy:

Western Kentucky University is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf and Discrimination and Harassment Policy (#0.2040) at https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

*Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the University and **MUST** report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159.*

Topics Covered and Approximate Class Schedule:

Week	Skills learned	Plan
1	Basic laboratory safety, culture of a lab, essential laboratory skills	**Objective**: Expectations, class policies, grading General lab safety Introduce projects Lab notebook Perform Pipetting exercises
2 Exp 1: Wolbachia Project	Molecular Biology skills, essential laboratory skills	**Objective**: Isolate DNA from insects you brought.
3 Continue Exp. 1	Molecular Biology skills, essential laboratory skills	**Objective**: Isolate DNA of control insects. Measure DNA via nanodrop spectrophotometer.
4 Continue Exp. 1	Molecular Biology skills, scientific method	**Objective**: Setup PCR for Insect Cytochrome oxidase gene (PCR control) and Wolbachia 16S ribosomal subunit on each of your DNA samples. Discuss how to make solutions correctly, solution calculations, prepare TBE buffer for running gels next week.
5 Continue Exp. 1	Molecular Biology skills, essential laboratory skills	**Objective:** Run gel electrophoresis on PCR products.
6 Continue Exp. 1	Molecular Biology skills, Cell biology skills	**Objective:** Setup Phage WO PCR and sequencing reaction for Wolbachia strain detection on Wolbachia positives. Review gel results and go over discussions and conclusions and review for midterm.
7 Start Exp. 2 Tetrahymena project and Finish Exp. 1	Molecular Biology skills, Cell biology skills	**Objective:** Introduce Tetrahymena, Observe Tetrahymena under microscope, learn how to use light microscope properly. If necessary, Run gel of phage WO to determine presence of bacteriophage.
8		Spring Break

9 Continue Exp. 2	Cell biology skills, essential lab techniques, Scientific method	**Objective:** Students get their mutant strain. Determine how pH is important for living cells. Acidify and alkalize normal growth buffer using pH meter. Observe Tet (Wild Type) and mutant in presence of these buffers. Determine the pH range for WT vs mutant.
10 Continue Exp. 2	Cell biology skills	**Objective:** Cell behavior assays- phagocytosis with appropriate controls are expected to be setup.
11 Continue Exp. 2	Cell biology skills	**Objective:** Stain cells with Mito Tracker to observe changes in mitochondria in WT vs mutants. Stain cells with methyl green to observe nuclei and go visit EM. Learn how to use ImageJ to measure nuclei
12 Finish Exp. 2	Cell biology skills	**Objective:** Cell behavior experiments- chemotaxis with appropriate controls.
13	Test essential lab techniques	Perform Final Exam Lab Practical
14		Work on Final Poster Presentation
15	scientific method, scientific data analysis and writing, professional presentation skills	Poster Presentations Turn in final lab report Turn in lab notebook for final grade Take lab final exam (theory portion 50%)

Syllabus changes:

The instructor reserves the right to modify this syllabus at any time during the course in as necessary.

Revised January 4, 2018