BIOSci 1950: MOLECULAR GENETICS LABORATORY - FALL TERM 2021

GENERAL INFORMATION

Lecture: Tuesday, 12:00 – 12:50 PM A221 Langley Hall
Lab:
  Section 1, Thursday, 12:00 – 4:50 PM A146 Langley Hall
  Section 2, Friday, 12:00 – 4:50 PM A146 Langley Hall

INSTRUCTOR: Dr. Xiaodong Zhu 144A Langley Hall
  xzhu@pitt.edu
Office Hours By appointment
Teaching Assistant: Sanchirmaa Namjilsuren san98@pitt.edu

PREREQUISITE & COREQUISITE

• BioSci 1810 (C grade or higher) in order to register
• For background knowledge, the following courses will be helpful: General Chemistry & Organic Chemistry I & II, plus Calculus I & II

COURSE DESCRIPTION AND OBJECTIVES

The primary objective of this course is to experience the operation of authentic scientific research in the field of molecular biology. The main experimental design is focused on molecular genetic approaches to study pathological mutations in polycystin2, a TRP family member ion channel and one of the two causative proteins underlying a disease known as autosomal dominant polycystic kidney disease (ADPKD). The hypothesis-driven projects, composed of multiple experiments, are parts of scientific investigations for research labs in the department. This course will teach and reinforce classical and fundamental molecular biology laboratory techniques, the theory behind the techniques, development of lab protocols, troubleshooting, identifying and closing gaps in protocols, analysis and interpretation of experimental results, and scientific record keeping. At the end of the course, students should be capable of thinking and planning independently, performing biomedical lab tasks, communicating, and testing scientific ideas. As an authentic research laboratory course, it will be challenging and will involve substantial effort. However, your effort can be rewarding and fruitful.

COURSE REQUIREMENTS

1. Attendance for Lecture and Lab.
   • Lab, lectures and exams will be conducted in person. Students must wear masks in door according to the University Covid 19 regulation. Failure to comply the University Covid 19 rules
will result in dismissal from classroom/lab. Attendance for the lab section is mandatory. Absences must be justified and may require documentation.

- For the first two weeks of the term, students may attend the lectures remotely on Zoom. Lab sections will be held in person. Students should take the responsibility to inform lab partners and faculty if having health or other issues. Any absence must be excused prior to the class by email directly to the instructors.

2. Time Expectations:
   - Expect to spend some time outside of the lecture and laboratory meeting times.
   - Be prepared for the lab – you will write your own plans and protocols.

3. Reading Material:
   - No textbook
   - Primary research publications and third-party research protocols will be assigned and distributed electronically via Canvas.

4. Communication:
   - We will communicate via Canvas, LabArchives and email.

**GRADING:**

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Performance</td>
<td>10%</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>30%</td>
</tr>
<tr>
<td>Lab Notebooks including pre-lab assignments</td>
<td>35%</td>
</tr>
<tr>
<td>Project Presentation</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LAB PERFORMANCE**

Attendance (each missing lab without a proper reason will get 2% deduction of total scores). Be reliable and responsible in the lab. Specifically, perform experiments, label samples and clean benches at the end of each section.

**EXAMS**

Two 50-minute exams will be given on principles and understanding of the project, lab techniques and applications. Exams are open to all information resources. **Exams must be completed independently.**

**NOTEBOOK**

Notebooks are an extremely important part of scientific research. We will use an electronic notebook system this term (LabArchives) that is time-stamped for all input and changes. Pre-lab assignments should be completed before the lab starts. Pre-lab assignments will be posted on Canvas>Files>Pre-labs. Completed pre-lab assignments should be submitted to LabArchives as the first part of each week’s lab notebook. Your notebook should be a real-time document containing all of your original data from your experiments. Gel and plate photos should be clearly labeled. The notebook should be self-contained and organized so that other investigators could understand and reproduce your recorded experiments. Your notebook provides the keys to recognize all samples you save in the freezer or refrigerator. Since this lab course does not require separate lab reports, your notebook should include a discussion/conclusion section as part of each experimental record. Timeliness is an important part of entry validity. Your notebook of each lab should be completed before the next lab. In the cases where conclusions are waiting for further investigation, this part may be entered in a
separate session without changing the original note timestamps. **Late assignments will take a 10% deduction per day.**

**PROJECT PRESENTATION**

A 15-minute poster presentation with your lab partners will be held at the end of the term. Your presentations are a significant portion of your grade, representing your achievement in this investigation, as well as your understanding of the mechanism of this biological process.

---

**BIOSC 1950_2021 TENTATIVE SCHEDULE:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture &amp; Lab Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 8/30</td>
<td>Lecture (Tuesday): Project overview, Syllabus, Review of Basic Lab Skills, DNA techniques Lab: Lab Safety, plasmid preps and restriction digestions for verification.</td>
</tr>
<tr>
<td>Week 2 9/6</td>
<td>Lecture (Tuesday): Molecular cloning, Gibson assembly, primer design, restriction maps Lab: Designing primers</td>
</tr>
<tr>
<td>Week 3 9/13</td>
<td>Lecture (Tuesday): Site directed mutagenesis, PCR, and Molecular cloning tools Lab: PCR and restriction enzyme digestion, gel purification</td>
</tr>
<tr>
<td>Week 4 9/20</td>
<td>Lecture (Tuesday): Guest lecture: Dr. Christopher Guerriero Lab: Gibson assembly and transformation</td>
</tr>
<tr>
<td>Week 5 9/27</td>
<td>Lecture (Tuesday): No lecture, picking up colonies Lab: Verification of your clones by restriction digestion and sequencing</td>
</tr>
<tr>
<td>Week 6 10/4</td>
<td>Lecture (Tuesday): Discussion session 1 Lab: Yeast transformation/Journal club</td>
</tr>
<tr>
<td>Week 7 10/11</td>
<td>Tuesday 12:00-1:00 pm, Lecture time: Re-streak Friday No classes. No labs on Thursday and Friday</td>
</tr>
<tr>
<td>Week 8 10/18</td>
<td>Exam 1 (Tuesday 12:00-1:00 pm) Lab: liquid growth testing/Journal club</td>
</tr>
<tr>
<td>Week 9 10/25</td>
<td>Lecture (Tuesday): yeast as a model organism Lab: cycloheximide chase</td>
</tr>
<tr>
<td>Week 10 11/1</td>
<td>Lecture (Tuesday): Protein techniques Lab: Sample process and SDS-PAGE, Transfer</td>
</tr>
<tr>
<td>Week 11 11/8</td>
<td>Lecture (Tuesday): Protein quantitation &amp; characterization Lab: Western Blot</td>
</tr>
<tr>
<td>Week 12 11/15</td>
<td>Lecture (Tuesday): PC2 mutant functional analysis Lab: for repeat experiments</td>
</tr>
<tr>
<td>Week 13 11/22</td>
<td>Thanksgiving week No class, no labs</td>
</tr>
<tr>
<td>Week 14 11/29</td>
<td>Lecture (Tuesday): Discussion session 2 Lab: Data analysis and poster preparation</td>
</tr>
<tr>
<td>Week 15 12/6</td>
<td>Exam_2 (Tuesday 12:00-1:00 pm) poster presentations – 15-20 minute each group</td>
</tr>
</tbody>
</table>

**NOTE:** This schedule may be modified during the semester. You will be notified of any such changes.
**General Rules of the Laboratory Safety**

- **Know the Locations of Room Exits, Eye Wash Stations, Shower & First Aid Kits:** know their locations and how to use them.
- **Hazardous Materials** (acids, bases, toxins): know where they are & after use, put them away, back where they came from.
- **Hazardous Waste Disposal:** use them appropriately. Special disposal is expensive.
  - **Glass Waste Bin:** glass only, no gloves, plastic, tissues etc.
  - **Biohazard Waste Bin:** experimental plates only.
  - **Ethidium Bromide Waste Bin:** Gels only, no gloves or paper towels.
- **Gloves:** always wear gloves in the lab, except when using computer keyboards.
- **Wash Hands Always:** whenever you leave the lab.
- **Wear appropriate clothing:** Lab coats are available.
- **Goggles/Eyeglasses are recommended & available.**
  - Contact lens wearers must wear eye protection when handling hazardous materials.
- **No food or drink in the labs.**
- **In the event of fire, evacuate the lab** – check to make sure your lab mate makes it out safely.
- **Be a conscientious citizen** – inform lab personnel of concerns or potential hazards, such as spills of unknown origin & do your part to keep the lab clean & organized.
- **Never use equipment without proper instruction:** everything but particularly centrifuges.

**Centrifuge Safety**

There are two general types of centrifuges in the Langley Teaching Labs:

- **Table-top centrifuges:**
  - for quick spins of 2 ml or less which do not exceed 20,000 rpm
  - using another Eppendorf tube for the balance
  - potentially dangerous
- **Sorvall high speed centrifuges:**
  - referred to as “floor model” centrifuges
  - handle large volume samples (greater than 5 ml to 500 ml)
  - rotors have different maximum speeds
  - must use balance tubes to operate
  - potentially dangerous & very expensive - usage requires training

**POLICY ON THE EXPORT OR IMPORT OF LAB MATERIALS:**

We do not permit any student to take any teaching lab samples, reagents or other materials to their research lab or back from their research lab to the Langley Teaching Lab. This policy is directed to biological reagents and samples, and it does not include electronic or paper documents. When students take experiments back to another lab space or carry supplies from their lab to the teaching labs, we cannot control the experiment or personal safety, which it is our responsibility to do.

**ACADEMIC INTEGRITY:**

Students in this course will be expected to comply with the University of Pittsburgh’s Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of
any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

**DISABILITY SERVICES:**
If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

**COPYRIGHT NOTICE:**
These materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See Library of Congress Copyright Office and the University Copyright Policy.

**STATEMENT ON CLASSROOM RECORDING:**
To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.