# General Goals of the Genetics Lab

- Learn basic molecular techniques, such as PCR, gel electrophoresis, restriction analysis, which are implemented in most research projects, and how to follow protocols.
- Explore bioinformatics as an extremely useful tool to study proteins and genomes.
- Gain basic knowledge on how to work with model organisms.
- Apply the tenets of the scientific method in both descriptive and quantitative analyses to conduct and independent but guided research project.
- Learn how to safely dispose of various hazardous and non-hazardous chemicals.
- Become independent in the laboratory.

## TEXTBOOK

This course does not have a required textbook. All handouts will be posted on BlackBoard. It is your responsibility to read the assigned lab material and prepare for your quizzes. Bring a notebook to every lab.

### PREREQUISITE

Prerequisites for this course are General Biology I and II with labs (grade C or better) and General Chemistry I and II with labs (grade of C or better).

### CO-REQUISITE

Students enrolled in this course must be enrolled in the Genetics Lecture (BIOL3321) or have taken Genetics lecture previously.

# Tentative Lab Schedule

<table>
<thead>
<tr>
<th>DATE</th>
<th>LAB TOPIC</th>
<th>TO DO BEFORE LAB</th>
<th>TO DO DURING OR AFTER LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-31 Aug</td>
<td>LAB 1: Pipetting and solution making. Quiz 1 will be on Lab Safety (see syllabus), and your first handout.</td>
<td>HW1 Q1A</td>
<td>Hand in pipetting worksheet (WS1). Pipetting skill test (Q1B).</td>
</tr>
</tbody>
</table>
| 5*-7 Sept| LAB 2: Cheek cell DNA extraction. **Lab starts at 1:15pm.**  
*Students in lab section LA (Monday) will attend lab on Friday, September 11th. Please email Dr. Simmons if you have a schedule conflict. | Q2A              | Q2B                       |
| 12-14 Sept| LAB 3: Student presentations. Introduction your independent experiment.           | Student presentations (P3) | HW3 (group) Due next week. |
| 19-21 Sept| LAB 4: Polymorphic regions: how many repeats do you have? **Lab starts at 1:15pm.** | Q4A              | HW4 (group) Due next week. |
| 26-28 Sept| LAB 5: Independent experiment: DNA extraction. **Lab starts at 1:15pm.**       |                  |                           |
| 3-5 Oct  | LAB 6: Independent experiments: PCR reactions. Students will have a 2-hour wait while PCR takes place. **Setup PCR previously. PCR reaction at 12:00pm.** Pre-lab Quiz 6. | Q6A              |                           |
| 10-12 Oct| Fall Break – no labs                                                      |                  |                           |
| 17-19 Oct| LAB 7: Independent experiment: Sample preparation for sequencing. Introduction to phylogenetic analysis with lizards. | HW7 (individual) |                           |
| 24-26 Oct| LAB 8: Independent experiment: Phylogeny of orchids.                      | HW8 (group)      | Student presentation (P8) |
| 7-9 Nov  | LAB 10: PyMOL                                                             | HW10 (individual) | Student presentation (P10) |
| 14-16 Nov| LAB 11: Student teams present the findings from their independent experiments. |                  | Mini-Report               |

**Abbreviations:**  
Q = Quiz; WS = Worksheet; HW = Homework; P = Student presentations

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Attendance and Assignments

• **You are expected to attend every lab session and arrive on time.** If you have an emergency that requires you to miss class you must notify your instructor immediately in order to plan a potential solution.

• Some experiments will require you to come to the lab outside the regular schedule and conduct specific procedures or collect data.

• If you have a **cell phone and/or pager**, please be sure to turn it to **silent mode** before lab begins. All other electronic devices **MUST** be turned OFF.

• All assignments must be turned in at the beginning of lab. **LATE ASSIGNMENTS WILL NOT BE ACCEPTED.** Be sure to follow the guidelines provided for each specific assignment.

Guidelines for Notebook

• You must use a bound notebook (no spiral) to keep track of the activities you perform during this lab.

• Leave a few pages at the beginning of the notebook for a Table of Contents, which you will complete as the lab progresses.

• Be thorough. Record the date, concentration of solutions you have used, how long your experiments ran, changes in coloration or smell. Sometimes you will need to repeat the experiment, or report your results, and having this information is very important. Be sure to use the appropriate units (metric). Write down all calculations as well.

• Do not erase anything. If you have made a mistake, or if something does not work, cross it out but do not erase it. It will allow you to keep a record of variables you have already tested, or as a reminder on what not to do.

Scholastic Ethics

The Education System is one **based on trust**: future employers trust that your grades reflect your level of achievement and knowledge, your parents trust that UST will provide you with the best education, and your professors trust you to do your own work and be honest. You must work towards developing your reputation as a student. This way we will trust you to be in our research teams and working in our labs. A professor that trusts you will write you great letters of recommendation and will support you. Once you loose that trust, it is very hard to get it back.

It is your responsibility to read the UST Policy on Academic Dishonesty in the Undergraduate Catalog. Each student must do their own work on exams, quizzes, and all assignments. Academic dishonesty includes (but is not limited to) making one’s work available to other students, copying another student’s work, plagiarizing information from any source, cheating on quizzes or exams, etc. All instances of academic dishonesty will be reported to the Academic Committee and the penalty will be at the discretion of the instructor: a grade of zero on the assignment or an F in the course.
## Activities and Grading

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lab</th>
<th>Points</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (20 pts each x 6)</td>
<td>1A, 1B, 2A, 2B, 4A, 6A</td>
<td>120</td>
<td>Beginning or end of each lab</td>
</tr>
<tr>
<td>Homework / Worksheet (15 pts each x 7)</td>
<td>HW1, WS1, HW3, HW4, HW7, HW8, HW10</td>
<td>105</td>
<td>See schedule</td>
</tr>
<tr>
<td>Graded, in-lab presentation (25 pts each)</td>
<td>P3, P8, P10</td>
<td>75</td>
<td>See schedule</td>
</tr>
<tr>
<td>Student final presentation on Independent Experiment</td>
<td>11</td>
<td>150</td>
<td>16-18 Nov</td>
</tr>
<tr>
<td>2-page Mini-Report on Independent Experiment</td>
<td>11</td>
<td>25</td>
<td>16-18 Nov</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>475</td>
<td></td>
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Keep track of all your grades so that you may assess your progress in this course. See table below for percentage/letter grade equivalencies. Please note that your instructor **WILL NOT** calculate your grade for you.

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>D+</th>
<th>C</th>
<th>C+</th>
<th>B-</th>
<th>B</th>
<th>B+</th>
<th>A-</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt;59</strong></td>
<td>60 – 65</td>
<td>66 - 69</td>
<td>70 – 75</td>
<td>76 – 78</td>
<td>79 – 81</td>
<td>82 – 85</td>
<td>86 – 88</td>
<td>89 – 91</td>
<td>92 – 100</td>
<td></td>
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</table>

**Incompletes (I)** are given only in extreme circumstances. For more information see the Student Handbook.

**Regarding your final grades:** “Course grades are communicated to students by the Registrar’s Office. Faculty members may not post course grades, even with a coded listing, or by any other means, whether orally or in writing, communicate them to the students” (UST Faculty Handbook).
In case of emergency, notify your instructor and campus security (713-525-3888). If directed, call 911.

Other contacts to be used only in case of emergency:
Lab Coordinator, Building Safety Captain – Jonathan Newsome (832) 971-5971
Building Safety Captain – Ruth Ann Bagnall (713) 525-3167

General Information:

- Completely read the assigned lab exercise or experiment BEFORE entering the lab.
- Teaching assistants are employees of the University and must be treated with the same level of respect as any other staff or faculty member.
- The consumption of food or drink in lab is PROHIBITED. All food items must remain OUTSIDE of the lab during class time. NO EXCEPTIONS. This includes chewing gum.
- Putting on makeup or contacts is not allowed in lab. Please do this before coming to class.
- Closed-toed shoes must be worn at all times. Open-toed shoes are not permitted. You will be asked to leave the lab if you arrive in sandals, flip flops, or shoes that do not adequately cover your feet. Wear lab-suitable clothing.
- If you are allergic or sensitive to any material used in lab, notify the instructor immediately. The Biology Dept. provides nitrile gloves for laboratory use.
- Never work in the laboratory alone, except with instructor permission. Access to the laboratory is limited at the discretion of the instructor and lab coordinator, especially during non-classroom times.
- No materials, reagents or instruments are to be removed from the lab, except by the instructor.

Lab Safety:

- All accidents, even the most minor, should be reported to the instructor, TA, or lab coordinator IMMEDIATELY.
- In case of fire, there is an evacuation route at both ends of the lab - take the route that takes you away from flames. (See attached floor plan). There is also a fire extinguisher in the lab. Only use if the fire has small risk of spreading and if usage does not put you in danger. Please leave the lab in a prompt but calm manner if a fire occurs, while alerting those around you that there is a fire in the building. Fire alarms are located near the entrances to Anderson Hall.
- There are shower and eye wash stations in all labs (see attached floor plan). If you ‘think’ you need to use a wash station, especially when your eyes are involved, then you do.
- There is a first aid kit for minor injuries located in the lab (see attached floor plan).
- Be careful not to touch hot glass - glass cools slowly. Use hot pads provided by instructor.
- Never leave a flame or hot plate unattended.
- Eye protection is provided and is to be worn when working with caustic liquids, especially acids or bases.
- Gloves should be worn when working with preserved specimens,
bacteria, buffers, or caustic liquids. Remove gloves BEFORE LEAVING.

- NEVER use your mouth to pipette solutions.
- Keep hands away from face and mouth while in lab.
- Wash your hands after lab, especially if you have been working with bacteria or chemicals.
- Horseplay and practical jokes can be dangerous and are not permitted.
- Keep all extra books and materials such as jackets stored away from your bench top.
- Dumb questions are not nearly as dangerous as dumb mistakes - please ask!!!!

Waste Disposal:

- You MUST clean your lab bench before leaving the laboratory for the safety of the students in the following labs. This includes washing your glass wear, wiping down your lab bench, and properly disposing of any waste generated.
- Disposable sharp objects such as scalpels, needles, or razor blades must be disposed of in a proper sharps container which will be provided to you if necessary.
- Broken or chipped glassware should be disposed of in the broken glassware disposal boxes. If in doubt, ask a professor or TA what you should do BEFORE you use it.
- Do not dispose of anything down the sink unless you have permission to do so by the instructor. Most chemicals CANNOT go down the sink and must be disposed of in a chemical or biohazard waste container.
- Biohazardous waste must be disposed of in a biohazard bag. DO NOT throw away biohazardous materials in the trashcan.
- Chemical spills should be cleaned according to the nature of the liquid. Notify the instructor of spills, especially if they involve acids, bases or caustic solutions.
- MSDS (material safety data sheets) are provided in an addendum to this safety information. Please reference the MSDS for chemicals you are working with in the lab so that you are aware of any potential hazards.

Please acquaint yourself with the following waste disposal and chemical hazard signs:
Universal biohazard symbol that indicates biohazardous waste. Do not discard non-hazardous waste in these containers.

NFPA Ratings that you may see on lab chemicals and solutions.