Syllabus for BIO 383H - Gene and Genome Analysis - Spring 2020
ISB 368  Mon 12:20-4:25pm, Wed 1:25-4:25pm
Or
ISB 368  Tue 11:30-3:35pm, Thu 12:35-3:35pm

Instructor:
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Office: N427 Life Science Laboratories
Email: hazen@bio.umass.edu

Required Textbook: none
Course website on moodle

Course description: In this class we will discuss concepts and applications of modern DNA technology including an introduction to the basic concepts pertaining to the field of genomics. We will begin by describing key molecular methods and how they are used in gene analysis. We will then move on to consider how entire genomes are analyzed and will familiarize ourselves with some of the basic bioinformatics’ tools that are commonly used by working biologists. Finally, we will consider the methods used to manipulate genomes as a means to determining gene function. This course is intended for sophomores and juniors and should serve as a bridge between 200-level courses and more advanced, specialty courses (e.g., 500-level courses). This course fulfills a component of the General Education Integrative Experience (IE) requirement for Biology majors. This course is designed to provide you with structured shared opportunities to practice your General Education learning objectives at a more advanced level and use integrated learning to prepare for the demands of the world beyond the University. This course meets criteria 2 and 3 of the IE experience; Biology students also need to take Biology 494L1, Life After Biology, to fulfill criteria 1 and to graduate. Prerequisite: Biology 285 or Biochem 275.

Molecular genetics and bioinformatics are powerful approaches to investigate the mechanisms of gene action. The aim of this course is to provide you with some basic practical knowledge and hands-on experience regarding some of the most common experimental methods used in molecular genetics and recombinant DNA research. The course is intended for beginners, and it is expected that students do not necessarily have basic familiarity with using micropipettes, operating laboratory equipment, or using bioinformatics software.

- Experiments will follow a logical sequence where the results from one experiment will be used in the next.

- There will be times that you will be extremely busy and others not busy at all. (The ‘not busy’ times are a good opportunity to get your notebook and wiki pages up to date.)

- The results of the planned experiments are unknown—you will be making actual discoveries in this class.
• Your success will depend on your ability to come prepared, listen carefully, pay
attention to protocol details, and cooperate with others.

• You will at times be handling dangerous compounds and laboratory equipment; *think
safety first* at all times (see page Error! Bookmark not defined.).

• The bulk of each day has been scheduled to perform experimental procedures, but
times have been scheduled throughout for more general instruction and discussion.

**Preparation**
All the reading and lab assignment pages for each meeting have been made available on
Moodle. It is your responsibility to go to Moodle before every class to get your assignment
for each day. It is furthermore your responsibility to read BOTH the lab manual and the
assigned background reading.

You will get easy points by keeping up to date with your reading. There will be random
quizzes on your reading assignments throughout the semester to check your preparation.
These quizzes will be open book/open notes, but will be timed. If you have prepared
adequately, even if you do not remember something specific, you will be able to go rapidly
to your notes and readings to find the answer. These quizzes will be graded, and the grades
you receive will constitute 1/8 of your final grade.

**Participation**
This is a small class, and it will be easy for the instructors to observe your class
participation. Participation in this context means working efficiently and in cooperation
with your lab partner. It makes sense to divide up laboratory duties between partners, and
we do not expect that both members of a team will perform every duty entirely evenly.
However, each student should try as much as possible to participate in all aspects of
experiments. Efficiency means that you are prepared when you arrive in class—you’ve
read the lab manual, and are ready to start right in. If it’s clear that you and your partner
are dividing up duties fairly evenly, and discussing your experiments and progress
together, you’re cooperating well. If you either hog all the action, or alternatively hang
back all the time, that is not good cooperation, and your participation grade will suffer
accordingly.

**Lab Notebook**
Although it seems tedious at first, keeping accurate records is an invaluable skill for a
scientist.

A notebook that accurately details the goals, methods, results, and conclusions of an
experiment allows others to continue your work in your absence or replicate and expand
upon your results. Such a notebook also makes it possible for you to review your
experiments in preparation for writing a report, modify future ones as necessary, and, in
the unlikely event of an accusation of misconduct, defend yourself against charges of fraud.

Many labs insist on having their scientists use a bound notebook rather than a loose leaf or
spiral-bound one to make the work transparent and to prevent accusations of dishonesty.
If pages can’t be removed, then it is easier to follow the actual course of events as recorded in the notebook, and for one scientist to carry on for another (who has retired, for example).

You should use the Student Lab Notebook with permanent binding from HM Publishing, available at the college bookstore. (You may have one left over from a chemistry lab.) Write in it with pen, and hand the copy to your instructor every Wednesday at the end of lab. See example notebook entry on page Error! Bookmark not defined. Every lab notebook has to be complete, and handed in separately.

Your notebook will be graded as follows:

<table>
<thead>
<tr>
<th>Points</th>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Purpose: Statement of goals</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Methods: Summary plus main details</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Results: all relevant pictures and calculations</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Discussion: Critical interpretation and explanation of results</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>On time. Due dates will be announced in class</td>
<td></td>
</tr>
</tbody>
</table>

Grading

12.5\% of your final grade will be based on your grades on in-class spot quizzes.

12.5\% of your final grade will be based on participation—the instructor’s observations of your performance during labs.

20.0\% of your final grade will be based on the scores you receive on your lab notebook

15\% of your final grade will be based on in class and final presentation.

40\% of your final grade will be based on the scores you receive on your lab reports.