

## Cells, Genes & Inheritance – Biology 112

### COURSE OVERVIEW

Cells are the basic functional units of living organisms, hence the study of their molecular composition, morphology, biochemical processes, information flow, and communication mechanisms is a fundamental field of biological investigation. Even if the subfield in which you are interested is not cellular/molecular biology, the concepts covered in this course will enhance your appreciation for and understanding of other areas of biology. And if you are not a biology major, the information provided in this class may be relevant to your health and understanding of various political issues surrounding the Human Genome Project.

After an introduction to the basic organization of cells, we will focus particularly on the events involving the nucleus. At a cellular level, these include the way that information is maintained and transferred within a cell and between cellular generations. At the organismal level, we will discuss inheritance and Mendelian genetics.

#### **Lecture Objectives:**

- 1) to introduce a variety of aspects of cellular structure and function. This means that you will gain an understanding of the major structural elements and processes occurring in a cell.
- 2) to introduce the mechanisms for information storage and flow within a cell. This means that you will understand the process of DNA replication, RNA transcription, and protein synthesis.
- 3) to explore the cellular mechanisms involved in information flow between generations. This means that you will gain an understanding of how genetic information is distributed during the processes of mitosis and meiosis. You will also understand the role of meiosis in generating genetic diversity.
- 4) to explore the technologies associated with genetic engineering. You will understand the basic techniques used to identify and characterize genes, as well as those used to create transgenic organisms.
- 5) to emphasize the concepts underlying the structure and function of cellular components. At the end of the course you should be able to recognize patterns of the structure/function of cellular components *not* directly studied in this course (and potentially applicable to other courses in biology and chemistry). For example, given a new protein and its function, you should be able to hypothesize about its structure (filamentous or globular, hydrophobic or hydrophilic).
- 6) to make apparent the importance of cellular biology and genetics to other biological fields.
- 7) to introduce a variety of ways of learning material, including traditional lectures, small group work, and active learning exercises.

### COURSE DETAILS

- ❖ We have scheduled several *discussions* throughout the semester. The activities planned during these meetings should help solidify, organize, or place in context, the material at hand.
- ❖ Each component of the course is important. The successful completion of each will facilitate the mastery of the material covered. All major components must be completed to receive a passing grade for the course (i.e. all the exams, lab reports, genetics worksheet, library project).
- ❖ ***Attendance and participation*** in all lecture/discussion sessions is expected.
- ❖ ***Quizzes*** will be given at the beginning of lecture or as take-home assignments. Missed quizzes cannot be made up unless notification of an absence from class was made **before** class time.
- ❖ ***Exams*** may be rescheduled only by PRIOR consultation with Nathan or Jennifer. If you are unexpectedly unable to come to class to take an exam, you must notify Jennifer or Nathan as soon as possible. You should do this by telephone, leaving a message or speaking with the secretary (Ruth McDaniel) if necessary. You may also send an email (but don't only send an email).
- ❖ ***Late penalties:*** For both the lecture and lab portions of the course, a 10% per day penalty will be levied on late work. The 10% penalty begins immediately following the due-time (i.e. a paper turned in at 4:30 when it was due at 1:00 will lose 10%). Please note that computer problems (disk failures, printer problems, etc.) are not an acceptable excuse for an extension. Be sure that you back-up all your work in at least two places (e.g. in your homes on pax AND on disk) and be sure

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you leave plenty of time for printing. If you have any questions about using the computing facilities, ask a faculty or staff member in the computing center well before the deadline for the project.

### DOCUMENTED DISABILITIES

Any student with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact Academic Support Services and the instructor during the first-two weeks of the semester (well in advance of any exams or quizzes).

### LABORATORY

Lab meets sporadically throughout the semester- see the laboratory calendar for details of dates. It is your responsibility to know the lab schedule and to complete all lab assignments.

#### Laboratory Objectives:

- 1) to DO science.
- 2) to further develop your skills in hypothesis generation and testing, statistics, and presentation of scientific results.
- 3) to introduce you to contemporary experimental laboratory procedures.
- 4) to amplify the concepts learned in the text and lecture.
- 5) to develop your skills in cooperative learning. These include open-mindedness, work-load sharing, attentive listening, productive disagreement, and responsible contribution to a group.
- 6) to continue to develop your skills in accessing the primary literature.
- 7) to provide you with experience in communicating with other scientists in the poster format.

Laboratory participation will include: attendance/promptness, performance on beginning of lab quizzes, preparedness for the days lab and for all meetings, completion of pre-lab assignments, participation, attitude, and quality of lab notebook turned in at the end of the semester.

In order to switch a lab period for a given week, you must consult with the instructor of the lab you are missing and the instructor of the lab you are hoping to visit to determine if it is appropriate or possible. Participation in all of the laboratories is required. Please make arrangements *prior* to the lab if missing an exercise due to a conflict or illness is absolutely unavoidable. For each unexcused, unmade-up lab, you will lose 50 points. If you miss two labs, you will fail the course.

### TEXT

Essential Cell Biology (2<sup>nd</sup> edition): An Introduction to the Molecular Biology of the Cell. Alberts et al. There is also a required supplementary reading that will be available in the bookstore.

### GRADING

There are 1000 total points in the class, as follows:

Exams- 3@ 125 points each

Final Exam (cumulative and new material)- 175

Quizzes & participation- 100

Genetics worksheet- 75

Library Project/Poster- 100

Laboratory Participation/quizzes- 125

Abstract- 50

### OPTIONS FOR CONTACTING US OUTSIDE OF CLASS:

Jennifer Jayne	x 1517	email: jayneje@earlham.edu	SH 135
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