MCB 422: Problem Solving with Genetic Tools
Course Syllabus Spring 2018

This syllabus may be altered by the instructor during the course. However, the terms for grading will not change.

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Course Overview

Course Objectives
MCB 422 explores classical and modern principles and techniques in genetics. The course is divided into two parts. Part 1, which is the major part of the course, uses computer simulations to teach you how to approach, execute and interpret a set of experiments in non-Mendelian and Saccharomyces cerevisiae (Bakers yeast) genetics. These simulations will require that you understand the key genetic principles behind the problem, devise a method or approach to solve it, and then use your knowledge of genetics to interpret your data—just like researchers do in a lab! The goal of this first part of the course is to develop your ‘critical thinking’ skills, teaching you how to think through and figure out complicated genetic problems on your own. In the second part of the course you will learn about the most up to date approaches in modern genetics. For this part of the course you will use recent publications to gain information on the newest and most current technological advances in this field, and then present your findings in the form of literature reviews. Here, the goal is to teach you how to research and interpret the published literature and then how to present your findings in the style of a scientific journal review article.

Course Website
All the course materials will be posted on the D2L course website. Please check the site regularly, in particular before lecture, for any announcements. If you cannot access this site at any time please contact Ross Buchan immediately. While every effort will be made to stick to the course schedule assignment deadlines may change due to unforeseen circumstances. In such situations as much advance notice will be given as possible.

Lecture and Attendance
Lecture will take place in the Henry Koffler Building, Room 209 on Thursdays and Fridays from 11am to 12.15pm.
All of the key biological principles behind the computer simulations and the new advances in genetics will be discussed in lecture. Incomplete lecture notes will be posted before class and we will complete them together using class discussions and some of the computer simulations. These final notes will not be posted after the lecture. Your participation in the discussions during lectures will contribute to your final grade. Therefore, attendance at lecture is highly recommended.

CELL PHONES: Please silence your cell phones and refrain from interacting with your text message service during lecture.

COMPUTER USAGE: Keep use of computers for purposes other than class activities to a minimum.

Office hours
Ross Buchan will be available for office hours after the Friday lecture session (from approximately 12.15pm-1.15pm at Koffler. In addition, there will often be opportunities to discuss problems you are having with the assignments during the lecture sessions. Nikita Fernandes will hold office hours after the Thursday lecture session (from 12.15-1.15pm).

Required Course Materials
Since computer simulations are used throughout the first part of the course you are strongly encouraged to bring a laptop to every lecture (or at least share one with another student) during this part of the course. Computers will also be provided, but you are free to conduct the simulation exercises on your own device, on your own schedule, provided assignments are handed in on time. Any internet-accessible computer on campus is fine for completing the exercises.

All of the biological principles and ideas behind the computer simulations will be discussed in class and therefore there is no assigned course textbook. However, if you do wish to read more about the topics discussed in class ‘An Introduction to Genetic Analysis’ (11th Edition) by Anthony Griffiths is a useful resource.

Course Assessment
Your final grade in this course will be determined as follows;

Lab Reports (16) = 60%
QuikChange Site Directed Mutagenesis Proposal = 8%
Literature Reviews = 21%
Scientific Communication = 6%
Quizzes = 5%
ASSIGNMENTS

Mendelstar (Module 1) and Pathfinder (Module 2) Lab Reports (60%)
After completing each of the assigned computer simulations you will write up your findings in the form of a short lab report (the format of this report will be discussed in class). The lab reports are weighted as follows;

MENDELSTAR (30% total)
Mitochondrial/Maternal/Sex Linked = 3%
Segregation Distortion or Penetrance = 3%
Problems 1-3 = 24% (8% each)

PATHFINDER (30% total)
Pathfinder 3 (Determine mating type) = 2%
Pathfinder 4 (Strain of opposite sex) = 4%
Pathfinder 5 (Genes in single color stage; recessive = 6%
Pathfinder 6 (Genes in single color stage; dominant = 6%
Pathfinder 7 (Order in which 4 alleles function) = 6%
Pathfinder 8 (Order function of alleles with same color phenotype) = 6%

New Approaches and Methods in Genetics (Module 3 29%)
QuikChange Site Directed Mutagenesis Proposal (8%)
A written proposal discussing the rational for mutating a residue in an assigned protein. This proposal will include primers designed to achieve this goal.

Literature Reviews (21% total)
Literature Review 1: Screening for Genetic Diseases = 7%
Literature Review 2: New Techniques in Genetic Engineering = 14%

While you are encouraged to discuss your ideas and any problems you encounter with your classmates and the instructors ALL ASSIGNMENTS MUST BE ENTIRELY YOUR OWN WORK (NO GROUP REPORTS ARE ALLOWED). In class and during office hours help and guidance will be provided but we will not give you the answers, check your solutions or edit papers.

Scientific Communication (6%)
Oral Presentation (4%): A 5 minute power point presentation on genetic (non-cancer) diseases. The dates of these presentations are in the course schedule and your attendance at all talk sessions is mandatory.

Class Participation (2%): Participation in class discussions during lecture.

Quizzes (5%)
Mendelstar Readiness Quiz = 2% (note all 3 quizzes must be completed to access other Mendelstar exercises; a written explanation of one of your quiz answers is to be submitted in the appropriate drop box on D2L.

Pathfinder Quiz = 3%
In class multiple choice test. PLEASE NOTE THAT NO MAKE-UP TEST WILL BE OFFERED. Therefore, please schedule any appointments or interviews outside the test time.

There is no mid-term exam or final exam for this course.

No bonus points or extra credit assignments are offered in this course.

Please note: This is the expected number and types of assessments for the course. However, due to unexpected circumstances or unanticipated changes these assignments may change, however, the OVERALL grading scheme will remain the same.

SUBMITTING ASSIGNMENTS
All assignments must be submitted as a word document in the appropriate drop box on D2L by the deadline on the drop box (see schedule). Permission for late submission must be obtained before the deadline and will require appropriate documentation such as a Dean’s Note. If you are unable to submit an assignment on time due to illness your work will only be graded without penalty if you provide a letter from your physician. Unexcused late submissions will be penalized as follows; <1hr late receives a 10% deduction, >1-24hrs after the deadline receives a 25% deduction, >24-48hrs late receives a 50% deduction, >48hrs will not be graded.

PLEASE NOTE THE FOLLOWING;
1) If you experience problems with Mendelstar and Pathfinder you must inform Ross Buchan immediately. Problems with software may arise and therefore all computer simulations must be completed well before the deadline. Since software problems require external IT support certain issues may not be resolved immediately. PLEASE COLLECT ALL OF YOUR DATA FROM THE COMPUTER SIMULATIONS WELL IN ADVANCE OF THE DUE DATE AND PLEASE REPORT ANY SOFTWARE PROBLEMS IMMEDIATELY. SOFTWARE PROBLEMS MUST BE REPORTED NO LATER THAN 48HRS BEFORE THE ASSIGNMENT DEADLINE. Late submissions due to software problems arising less than 48hrs before the deadline may not be resolved in time, and in such cases no allowances will be made for submitting incomplete work and if the assignment is submitted late it will be penalized as described above.

2) Students sometimes experience problems submitting assignments through D2L. Make sure that you receive confirmation of your submission (keep this for your records). It is your responsibility to ensure that your work is correctly submitted, therefore, give yourself adequate time before the deadline to submit and receive confirmation of submission (submitting work too close to the deadline is most likely to lead to submission problems). Also, make sure you submit the final or correct draft! IF YOU DON’T RECEIVE
CONFIRMATION OF YOUR SUBMISSION IN ADEQUATE TIME BEFORE THE DEADLINE OR IF YOU ARE UNSURE, FOR ANY REASON, THAT YOUR SUBMISSION HAS WORKED, E-MAIL YOUR ASSIGNMENT IMMEDIATELY TO ROSS BUCHAN. IF IT IS RECEIVED BEFORE THE DEADLINE IT WILL BE GRADED WITHOUT PENALTY. THEREFORE, ASSIGNMENTS RECEIVED AFTER THE DEADLINE DUE TO ANY D2L PROBLEMS OR ANY OTHER COMPUTER PROBLEMS EXPERIENCED DURING SUBMISSION WILL BE PENALIZED OR NOT GRADED (SEE ABOVE).

GRADING: during the course the standard numerical scale (i.e. 90-100% = a etc) will be applied. Your scores for each assessment will appear as a percentage in your grade book.

Academic Ethics

ALL OF YOUR ASSIGNMENTS MUST BE YOUR OWN WORK. YOU CANNOT COPY ANY MATERIAL (REGARDLESS OF THE LENGTH) FROM ANOTHER STUDENT (PAST OR PRESENT), SCIENTIFIC LITERATURE (ALL FORMS OF RESEARCH ARTICLES), WEBSITES OR TEXT BOOKS. If you discuss material from scientific literature, websites or textbooks you must completely paraphrase the material and then cite the source. PARAPHRASING ANOTHER STUDENTS WORK (PAST OR PRESENT) IS NOT PERMITTED.

Plagiarism will not be tolerated under any circumstances. Students caught submitting assignments that contain plagiarized material will be disciplined which may include loss of credit and further action as deemed appropriate according to the rules and regulations of the University of Arizona. For further information please see http://dos.web.arizona.edu/uapolicies/.

Policy Against Threatening Behavior by Students

Any threatening behavior towards a student or member of staff will not be tolerated under any circumstances. For more information please see http://policy.web.arizona.edu/~policy/threaten.shtml.

Disability Resource Center (DRC)
Students requiring accommodations for any part of the course must first register with DRC and then provide Ross Buchan with a letter from DRC detailing their requirements. Upon receiving the appropriate documentation every effort will be made to meet the requirements as soon as possible.