Course Syllabus – BIOL 510

Course Information

Course Number: BIOL 510 SP19  
Course Name: Genetics and Genomics  
Term: SP 2019  
Start Date: 03/25/2019  
End Date: 06/14/2019  
Credits: 3.0

Meeting Days / Times

Mondays and Wednesdays, 8:15-9:45am PST / 11:15am-12:45pm EST  
(See Calendar in Canvas for the most up-to-date schedule.)

Locations

CA Campus: Graduate Office (Hazen Theory Building) Dining Room  
FL Campus: B387

Course Managers

<table>
<thead>
<tr>
<th>Role</th>
<th>Last Name</th>
<th>First Name</th>
<th>Email Address</th>
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</thead>
<tbody>
<tr>
<td>Instructor</td>
<td>Torkamani</td>
<td>Ali</td>
<td><a href="mailto:atorkama@scripps.edu">atorkama@scripps.edu</a></td>
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<tr>
<td>TA</td>
<td>Gangavarapu</td>
<td>Karthik</td>
<td><a href="mailto:gkarthik@scripps.edu">gkarthik@scripps.edu</a></td>
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Course Description

This course is a survey of the major applications of genetics and genomics in research, with some emphasis on human disease research. This includes both genetic and genomic technologies for characterizing determinants of human health, as well as the various applications of genomic technologies for the global molecular characterization of and perturbation of model systems in research. Multiple layers of ‘omics – from the genome, to epigenome, to the microbiome and pathogen genomes will be discussed. One lecture per week will be paired with one student-led journal club discussion. Students will be graded on their participation, presentations, a mid-term exam and a final exam.

Program Learning Outcomes

By the end of the program, students will have accomplished these objectives:  
PLO1: Published research story.
PLO2: Generate creative approaches and methodologies for complex scientific questions.
PLO3: Master a potent set of technical research skills.
PLO4: Possess strong communication skills.

Course Learning Outcomes

Upon completion of this course students will be able to:
CLO1: Know and understand the basic structure of the genome, genes, and regulatory features.
CLO2: Gain familiarity with the resources available for understanding the regulatory and genetic structure of specific genes or genomic regions of interest.
CLO3: Understand multiple strategies for mapping the genetic etiology of disease – from mapping common complex traits in large populations to identifying the genetic cause of disease in family based studies.
CLO5: Be exposed to and understand the molecular phenomena that can be characterized via genomic assays and technology – including the transcriptome, epigenome, and microbiome.

Background Preparation (Prerequisites)

There are no prerequisites for this course. The course is intended to be an introduction to genetic and genomic methods. An introductory course in basic genetics and molecular biology is recommended.

Required Course Materials

N/A

Instructor Policies

The course is intended to expose and provide a basic understanding of the vast array of genetic and genomic techniques and resources available for biological research. The course is suitable for students of any background who wish to gain a familiarity with these topics. The intent is to come out with a good grasp of available resources and assays in order to form specific hypotheses in an area of interest or in order to apply the appropriate technique for characterization of cellular/animal models. Students are not expected to become experts in any of the topics covered during the course. Rather, students are expected to actively participate in lectures, by asking questions and making comments on topics discussed where details are unclear, in order to gain the maximum benefit of understanding and enable the student to integrate the various genomic techniques into a powerful toolbox of methods for biological inquiry.
Course Requirements

Grading will be based on weekly participation in journal article discussions (50%), a take home mid-term exam (20%), and take-home final exam (30%).

Attendance Statement

Students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from the course director or teaching assistant. Unapproved absences or late attendance for three or more classes may result in a lower grade or an “incomplete” for the course. If a student has to miss a class, he or she should arrange to get notes from a fellow student and is strongly encouraged to meet with the teaching assistant to obtain the missed material. Missed extra-credit quizzes will not be available for re-taking.

Scientific and Professional Ethics

The work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and authors you read. If you ever have questions about drawing the line between others' work and your own, ask the course professor who will give you clear guidance. Exams must be completed independently. Any collaboration on answers to exams, unless expressly permitted, may result in an automatic failing grade and possible expulsion from the Graduate Program.

Technology Requirements and Support

For issues related to Canvas, please contact the Graduate Office by email at: gradprgm@scripps.edu or by phone at: 858-784-8469.

Course Grading

Grading is in accordance with the academic policies of the Skaggs Graduate School.

Participation: 50%
Take Home Midterm Exam: 20%
Final Exam: 30%

Grade Point        Letter Grade
4.00              A

Outstanding achievement. Student performance demonstrates full command of the course subject matter and evinces a high level of originality and/or creativity that far surpasses course expectations.
3.67  A-
Excellent achievement. Student performance demonstrates thorough knowledge of the course subject matter and exceeds course expectations by completing all requirements in a superior manner.

3.33  B+
Very good work. Student performance demonstrates above-average comprehension of the course subject matter and exceeds course expectations on all tasks as defined in the course syllabus. There is notable insight and originality.

3.00  B
Satisfactory work. Student performance meets designated course expectations and demonstrates understanding of the course subject matter at an acceptable level.

2.67  B-
Marginal work. Student performance demonstrates incomplete understanding of course subject matter. There is limited perception and originality.

2.33  C+
Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.

2.00  C
Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.

0.00  I
Incomplete is assigned when work is of passing quality but is incomplete for a pre-approved reason. Once an incomplete grade is assigned, it remains on student’s permanent record until a grade is awarded.

0.00  P
Satisfactory work. Student performance demonstrated complete and adequate understanding of course subject matter. Course will count toward degree.

0.00  F
Unacceptable work/Failure. Student performance is unacceptably low level of knowledge and understanding of course subject matter. Course will not count toward degree. Student may continue in program only with permission of the Dean.

0.00  W
Withdrew from the course with Dean’s permission beyond the second week of the term.

- All courses will be recorded and maintained in the student’s permanent academic record; only courses that apply towards the degree will appear on the academic transcript. Non-credit or audited courses will not appear on the transcript.
- 4 core courses taken for a letter grade (pass = B- or higher for a core course)
- 2 elective courses taken pass/fail (pass = A, B, C for an elective)
Because students are encouraged to take electives outside their area of expertise, a "C" letter grade is passing.

**Course Summary:**

<table>
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<tr>
<th>Date</th>
<th>Details</th>
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<tr>
<td>Mon Mar 25, 2019</td>
<td>Genes and the Genome - Ali Torkamani</td>
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<td>Wed Mar 27, 2019</td>
<td>Journal Club</td>
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<tr>
<td>Mon Apr 1, 2019</td>
<td>Meiotic Mapping and Genetic Linkage - Ali Torkamani</td>
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<td>Wed Apr 3, 2019</td>
<td>Journal Club</td>
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<td>Mon Apr 8, 2019</td>
<td>Rare Variants and Genome Sequencing - Amalio Telenti</td>
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<td>Wed Apr 10, 2019</td>
<td>Journal Club</td>
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<td>Mon Apr 15, 2019</td>
<td>Population Genetics - Nathan Wineinger</td>
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<td>Wed Apr 17, 2019</td>
<td>Journal Club</td>
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<td>Mon Apr 22, 2019</td>
<td>Structural Variation - Johnathan Sebat</td>
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<td>Wed Apr 24, 2019</td>
<td>Journal Club</td>
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<tr>
<td>Mon Apr 29, 2019</td>
<td>Transcriptomics - Pejman Mohammadi</td>
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<tr>
<td>Wed May 1, 2019</td>
<td>Journal Club</td>
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<tr>
<td>Mon May 6, 2019</td>
<td>Take-Home Midterm Exam</td>
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<td>Wed May 8, 2019</td>
<td>Epigenomics - David Gorkin</td>
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<td>Mon May 13, 2019</td>
<td>The Microbiome - Rob Knight</td>
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<td>Wed May 15, 2019</td>
<td>Journal Club</td>
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<td>Mon May 20, 2019</td>
<td>Pathogen Genomics - Matthias Pauthner</td>
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<td>Wed May 22, 2019</td>
<td>Journal Club</td>
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<td>Mon Jun 3, 2019</td>
<td>Gene Editing - Aaron Smargon</td>
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<td>Wed Jun 5, 2019</td>
<td>Journal Club</td>
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<tr>
<td>Mon Jun 10, 2019</td>
<td>Take-Home Final Exam</td>
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