

## OVERVIEW AND SYLLABUS

### GCB/CAMB 752 – Seminar in Genomics

Spring 2020: Monday 3 PM to 6 PM, BRB 253

#### COURSE DIRECTORS:

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**COURSE GOALS:** There are several goals for this course. One is to provide exposure to seminal and current 'omics approaches and research applications (including genomics, epigenomics, transcriptomics and proteomics). A second goal is to provide a forum to further develop students' critical thinking skills through literature review and class discussions. A third goal is to develop the skills necessary to search the literature on a given topic and provide a clear and concise review of the research area, an essential step toward identifying gaps in knowledge that may serve as foundations for new research ideas and grant proposals. These goals will be achieved through instructor presentations, readings, class discussions, and a writing assignment. Prerequisite: GCB 531/534 Intro to Genomics or equivalent, or permission of instructor.

**COURSE DESCRIPTION:** The class will meet once a week for a (maximum) 3-hour period. Each class will involve a faculty member providing an introduction from an experimental and/or computational standpoint of the literature that assumes basic knowledge of the subject. There are two course directors and at least one of them will attend every session. During each class, faculty will provide an introduction lasting up to 30 minutes followed by a breakout discussion lasting 30 minutes. During the breakout session, students will be separated into two pre-assigned groups and each group will have a student leader/presenter. Each group will discuss one of two assigned research papers and answer a previously provided question from the instructor using all available resources. Following the breakout sessions, each group leader will have 30-40 minutes to present their assigned paper and answer the instructor-assigned question to the whole class.

The course will be divided into two major segments:

Segment 1: Core 'omics (weeks 1-11)

Segment 2: Genomics and Genetic Models of Complex Diseases (weeks 12-16)

During the first segment of the course, recent papers from the primary 'omics literature will form the core material for the course. During the second segment, we will focus on human disease genomics, model organisms used to study these diseases, and genomics in medicine. Current literature pertaining to genomics and disease models for two complex human diseases will be discussed. Each disease will be discussed for two classes. At the beginning of the first class, an instructor will present an overview of the disease (e.g. symptoms, incidence rate, diagnosis, prognosis, and known/unknown aspects of what causes the disease).

**READING ASSIGNMENTS:** One week prior to their session, the instructor will assign two primary research papers, one for each group. The instructor may also elect to provide a single review article that provides relevant background. The instructor will also provide a discussion question on each paper to guide student reading, critical thinking, and discussion. Students are responsible for reading these materials before each session. Each student is also required to post on CANVAS a discussion question that they would like the breakout group, or the faculty lecturer, to answer during the breakout sessions and/or paper presentations.

**WRITING ASSIGNMENT:** There will be one major writing assignment in the format of a Review Article or News and Views. Early in the course, students will propose a topic and set of recent papers on a particular area of genomics. They will be asked to write a review article synthesizing the key ideas in the papers and explaining their significance. Proposed topics/papers will be due on February 17th. Proposed topics will be reviewed and approved by the course directors. Additional details will be provided in class. NOTE: It is highly recommended that BGS students preparing for the preliminary exam utilize this as an opportunity to review the literature pertinent to their exam proposal topic.

**CANVAS:** The course directors will post assigned papers, and questions provided by specific faculty instructors at least one week prior to each class. The students are required to post their question for each assigned paper by 5 pm the day before the breakout session.

**COURSE GRADE:** The course grade will be based on: 50% writing assignment, 20% paper presentation, and 30% on participation as judged by submitting questions on CANVAS.

Week	Date	Topic	Instructor
1	Jan 15 (Wed)	Introduction and brief organizational meeting	Sharon Diskin Kara Maxwell
2	Jan 20	No Class: MLK Day	
3	Jan 27	Genomics/Genetics (General)	Kara Maxwell
4	Feb 3	Transcriptomics	Yoseph Barash Pablo Camara
5	Feb 10	Spatial and Functional Genomics	Allesandro Chesi
6	Feb 17	Microbiome *Writing Topic Proposals Due*	Rick Bushman
7	Feb 24	Epigenomics	Roberto Bonasio
8	Mar 2	No Class: Spring Break	
9	Mar 9	Single cell approaches to 'omics	Kai Tan
10	Mar 16	Model Organisms	John Murray
11	Mar 23	Proteomics and Posttranslational Modifications *Writing assignment due*	Benjamin Garcia
12	Mar 30	Cancer Genomics	Kara Maxwell Sharon Diskin
13	Apr 6	Cancer Models/Translational	Kara Maxwell Sharon Diskin
14	Apr 13	Neurodevelopmental Disorder Genomics	Maja Bucan Tom Jongens
15	Apr 20	Neurodevelopmental Disorder Models/Translational	Maja Bucan Tom Jongens
16	Apr 27	Genomic Medicine	Kara Maxwell Sharon Diskin