Draft Syllabus for OEB 252. Coalescent Theory — Fall, 2024

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Teaching Fellow TBD

Lecture: M,W 1:30-2:45pm, TBD

Section: F 1:30-2:45pm, same room TBD

Sept 4	Introduction to the course	
9	Introduction to population genetics	
11	Gene genealogies, mutations, genetic data (Chapter 1)	
16	Probability, Wright-Fisher and Moran models (Chapters 2 & 3)	
18	Kingman's coalescent, properties of gene genealogies	
23	Incorporating mutations into the coalescent process (Chapter 4)	PS 1 DUE
25	Standard neutral coalescent predictions about genetic variation	
30	Deviations and simple statistical tests of the standard model	
Oct 2	Markov processes, Wright's island migration model (Chapter 5)	
7	Review of Kingman and calculations, more island model	
9	*Columbus Day* $\longrightarrow$ *Indigenous Peoples' Day Holiday*	
14	*Nm* and (Herbot's) structured coalescent	PS 2 DUE
16	Strong selection and recombination, Kretiman *Adh* data	
21	Recombination and identity by descent, IBD blocks	
23	IBD blocks 2, then separation of time scales (Chapter 6)	
28	Möhle's robustness results: dioecy versus partial selfing	
30	Coalescence within population pedigrees I	
Nov 4	The ancestral selection graph (Chapter 7)	PS 3 DUE
6	The ancestral recombination graph	
11	Statistical inference and Monte Carlo methods (Chapter 8)	
13	Gene trees, species trees and introgression	
18	Multiple mergers and simultaneous multiple mergers	
20	Coalescence within population pedigrees II	
25	Buffer for in-class presentations	PS 4 DUE
27	*Thanksgiving Holiday*	
Dec 2	Buffer for in-class presentations	
4	Buffer for in-class presentations	

Course Work:

- Four problems sets, posted on the course site at least one week prior to due dates.
- Group research project(s) culminating with in-class presentations.

Grading:

Grades will be based on participation, problem sets, and the research/presentation:

Participation	20%
Problem Sets	40%
Research/Presentation	40%

Participation means attending class and being an active participant, e.g. asking questions and volunteering answers in lectures and being engaged in the research project.

Everyone can get an A...

Textbook:

Wakeley (2008) *Coalescent Theory: An Introduction*. Macmillan (macmillanlearning.com)

Office Hours:

Professor Wakeley: W 3:00-4:00pm in 4096 Bio Labs or by appointment.

TF TBD: TBD

Section:

Most of these will be devoted to the research projects, others to reviewing lecture material. This is also the place to ask questions about the problem sets or talk about the presentation.

The Harvard College Honor Code:

Please familiarize yourself with the information available at honor.fas.harvard.edu and hold yourself accountable to the Honor Code.