MOLECULAR EPIDEMIOLOGY

20375 - BIOL439 - A01
January 6 – April 4, 2025

COURSE OUTLINE

LECTURER: JOHN S. TAYLOR

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Lectures: TWF: 9:30 AM − 10:20 PM − Cornett A120.

COURSE DESCRIPTION. This course provides an introduction to the basic principles and applications of molecular epidemiology. We focus on the identification of genes that play a role in disease in humans (e.g., using linkage and association studies, exome and genome sequencing) and the implications of such discoveries for diagnosis, screening, and treatment. Cystic fibrosis, cancer, HIV progression, and the human HapMap are among the subjects covered. A key component of the course is the completion and presentation of semester-long group projects.

EVALUATION

1. ASSIGNMENTS: (50 pts)
   - i) OR assignment (5)
   - ii) Reading assignment: Pre-implantation genetic diagnosis (5)
   - iii) CanRisk breast cancer risk assignment (5)
   - iv) HapMap assignment: Selecting tagging SNPs (5)
   - v) Group presentation (10)
   - vi) Research report (20)

2. MID-TERM EXAM: (20 pts)

3. FINAL EXAM: (30 pts)

Grading scheme: A+ (90%-100%), A (85-89%), A- (80-84%), B+ (77-79), B (73-76%), B- (70-72%), C+ (65-69%), C (60-64%), D (50-59%), F (<50%), N (max. = 49%): Failure to complete one or more of the following: Mid-term exam, Final exam, Research Report.

UVic is committed to promoting, providing and protecting a supportive and safe learning and working environment for all its members.

Lecture schedule

Lecture	Date	Topic	
1	**Jan. 7**	Exposure, Spot Maps and Odds Ratio	Start Assignment 1
2	**8**	Cystic Fibrosis, LOD Score	
3	**10**	CF, RFLPs, Linkage	Assignment 1 due
4	**14**	F508del	
5	**15**	Pre-implantation Genetics Diagnosis	Start Assignment 2
6	**17**	Gene Therapy/ Personalized Medicine and CF	
7	**21**	Newborn Screening and PPV	
	22	Groups meet in class	Assignment 2 due
8	**24**	**Dr. Graham Sinclair**	
9	**28**	Cancer Linkage Studies	Start Assignment 3
10	**29**	Odds Ratio, Relative Risk, and *BRCA1* & *BRCA2*	
11	**31**	Interactions among loci	
12	**Feb. 4**	Hazard Ratio/ Tumor Transcription	Assignment 3 due
13	**5**	Tumor Transcription/Over-diagnosis	
	7	Midterm	
14	**11**	HIV-AIDS	
15	**12**	The Hap Map, GWAS and Macular Degeneration	Start Assignment 4
16	**14**	Groups meet in class	
	18	*Reading Break*	
	19	*Reading Break*	
	21	*Reading Break*	
17	**25**	**Dr. Jennifer Nuk** Oncotyping	Assignment 4 due
18	**26**	Transcriptome and Exome sequencing	***Last day to drop***
19	**28**	Whole genomes	
20	**Mar. 4**	Genetic Resilience	
21	**5**	Genome Prediction.	
	7	Group Presentations Begin	

Academic Integrity

Learning Objectives

1. Students will learn that risk, in the context of epidemiology, can be estimated using the odds ratio (OR) and hazard ratio (HR).
2. Students will learn how the logarithm of odds score (LOD score) is used to identify loci that influence disease risk.
3. Students will learn about Genome Wide Association Studies (GWAS) and Genome Prediction studies and be able to explain how they differ from Linkage Studies.
4. Students will be able to explain in detail methodologies/tools used to screen human populations for disease-associated loci.
5. Students will be able to discuss the benefits and costs associated with genetic screening and reflect upon specific studies when doing so.