

BISP 194 / BGGN 285

Contagion: Molecular Epidemiology of Infectious Diseases

Fall 2022:

Tuesdays

11:00 am – 12:20 pm PT

York 3010*

Instructor:

Professor Joel O. Wertheim

Preferred method of contact: jwertheim@health.ucsd.edu

Office Hours:

Mondays

2:00 pm PT or by appointment

Zoom Meeting: <https://uchealth.zoom.us/j/87141164894>

Zoom Password: MeV-1

Zoom Link: <https://uchealth.zoom.us/j/87141164894?pwd=WDd6T3FqbytBQ3FZaXZHZzdsVm9ldz09>

Summary. In this course, we will explore the factors that underlie the emergence, epidemiology, and evolution of infectious diseases. We will use the 2011 feature film *Contagion* as an entry point to understanding how we can use molecular tools to understand and combat these emerging threats. Students will read and discuss the primary literature describing the current state of the field, with a particular focus on viral pathogens like HIV and SARS-CoV-2.

Purpose. To provide you with the opportunity to expand your knowledge of biology by reading and analyzing the primary literature related to the molecular epidemiology of infectious diseases.

Class format. This class will be held in-person to facilitate interaction and evaluate learning objectives. Recordings of each session will be posted on Canvas after each class. If in-person participation is not feasible, alternative written assignments will be made available.

Weekly Responsibilities. Every week, you are to do the assigned reading(s) for that week. For each assigned research article, you must submit a video recorded question about the reading via Canvas. Audio recordings and/or written questions are acceptable only in limited, justified circumstances. These questions must be submitted by 3 pm the Monday before class. Questions submitted after this deadline will be scored accordingly.

In addition to these questions, students must also complete a brief written assignment for each assigned research article to gauge comprehension of each of the readings. The template for this assignment is available through Canvas.

Final Writing Assignment. Find a published research article that both (i) employs molecular epidemiology to aid in our understanding of the COVID-19 pandemic and (ii) relates to a scientific topic encountered during the film *Contagion*. This article must be a primary research article (i.e., not a review article or a commentary) and cannot be one of the assigned course readings.

Write a short essay (1000-1500 words) that answers the following questions: (i) What is the scientific question addressed by the authors? (ii) Have they satisfactorily and convincingly answered this question? (iii) How accurately was this particular aspect of the COVID-19 pandemic represented in *Contagion*? (iv) What further research is needed on this topic?

This essay should demonstrate your understanding of molecular epidemiology (e.g., appropriate interpretation of phylogenetics or other genetic/genomic analysis). This essay should also summarize both the research article—including its relevant methods and results—as well as the relevant scene(s) in *Contagion*. The essay must place your selected research article in a broader scientific context, as evidenced by the citation of 5-10 additional articles published in scientific journals. Citations may be in any style, provided they are internally consistent.

Examples of topics include—but are not limited to—adaptive mutations, viral migration, zoonosis, viral recombination, etc.

You must submit your selected article for approval (via Canvas) by Wednesday, November 9th. Final writing assignment due on Friday, December 2nd.

Grading. Your responsibilities in this course are to (i) do the weekly readings, (ii) submit questions and summary of readings in advance, and (iii) meaningfully engage during class. Your grade breakdown is as follows: weekly question submission (25%), weekly reading summaries, (25%), attendance/asynchronous writing assignment (25%), and final writing assignment (25%). Grades will be assigned: A, A-, B+, B, C, D, or F.

BGGN 285 Additional Responsibilities. Each BGGN 285 Master's student is required to give a 10-12 minute "PowerPoint" presentation on an assigned article. This presentation will provide a concise overview of the study, its motivations, design, and findings. This presentation will constitute 20% of your grade. Keeping to the time-limit is an important part of this presentation.

***COVID-19 DISCLAIMER**

At any point during the Fall Quarter, at the sole-discretion of the Instructor, this course may shift that week's class to a Zoom-only format. In case of this transition, course structure and grading rubric will remain unchanged.

COURSE OUTLINE AND READING ASSIGNMENTS

Date	Topic	Readings
September 27	Welcome: Contagion	–
October 4	Introduction to Epidemiology	<i>Contagion</i> (Film) Luby 2006 Poon 2016
October 11	Introduction to Phylogenetics	Baum 2005~ Fox Lewis 2022* Keita 2021*
October 18	Advanced Phylogenetics	Jackson 2021* Worobey 2016*
October 25	R_0	Dudas 2018*
November 1	SIR Models	du Plessis 2015~ Pekar 2022
November 8	Epidemic Intelligence Service	Cohen 2014~
November 15	Virulence	Fraser 2014~ Wertheim 2022~ Wymant 2022*
November 22	Adaptive Immunity and Vaccines	Worobey 2014* Kustin 2021*
November 29	Ancient Infections	Duggan 2016* Spyrou 2022*

* articles that can be presented by a BGGN 285 Master's student

~ non-research articles that do not require a written assignment

Please note that this schedule includes a guest speaker. Weekly readings may be shifted to accommodate a modified schedule.