BISP 194 / BGGN 285
Contagion: Molecular Epidemiology of Infectious Diseases

Fall 2023:
Monday
1:30 pm – 2:50 pm PT
York 3010*

Instructor:
Professor Joel O. Wertheim
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Office Hours:
Thursdays
1:30-2:30 pm PT or by appointment
Zoom Meeting: https://uchealth.zoom.us/j/81375070642
Zoom Password: MeV-1
Zoom Link: https://uchealth.zoom.us/j/81375070642?pwd=eWlKMlhiV1IyUnJNOEl1QUcxakJYZz09

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 epidemiology to study and combat these emerging threats. Students will read and discuss primary literature describing the current state of the field, with a particular focus on viral pathogens like HIV and SARS-CoV-2.

Purpose. 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 will read the assigned articles before class. For each assigned research article, you must submit a video-recorded question about the reading via Canvas. Audio-only recordings and/or written questions are acceptable only in limited, justified circumstances. These questions must be submitted by 3 pm the Sunday before class. Questions submitted after this deadline will not receive full credit.

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 and is to be submitted by 3 pm the Sunday before class. Responses submitted after this deadline will not receive full credit.

Final Assignment Justification. *"In order to promote authentic learning experiences and discourage potential academic dishonesty, I have made the decision not to assign traditional essays this year. Instead, I will be focusing on diverse forms of assessment that encourage critical thinking, active engagement, and skill development. One alternative assignment I will be implementing is a recorded PowerPoint presentation. By assigning this task, students will have the opportunity to thoroughly research and present their understanding of the subject matter while utilizing visual aids and effective communication techniques. This approach fosters creativity, presentation skills, and the ability to effectively convey complex ideas. Additionally, it allows for a more comprehensive evaluation of student learning while minimizing concerns about potential misuse of AI tools. By embracing this format, students will engage actively in their learning, while gaining valuable skills applicable in both academic and professional settings.*

And remember, if this explanation was more coherent than usual, it's because ChatGPT's sly digital pen had a hand in crafting these oh-so-eloquent words. Stay classy, cyberspace!"

– ChatGPT

Final Assignment. Find a published research article that both (i) employs molecular epidemiology to aid in our understanding of a viral pathogen 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.

Record an 8-10 minute PowerPoint-style presentation that shows both slides and your face. The presentation should address the following questions:

1) What is the scientific question addressed by the authors?
2) Have they satisfactorily and convincingly answered this question?
3) How accurately was this particular aspect of the molecular epidemiology and virology represented in *Contagion*?
4) What further research is needed on this topic?

This video should demonstrate your understanding of molecular epidemiology (e.g., appropriate interpretation of phylogenetics or other genetic/genomic analysis presented as Figures in the original paper). This video should also summarize both the research article—including its relevant methods and results—as well as the relevant scene(s) in *Contagion*. The quality of your presentations will also be evaluated as part of the final grade. Do not read from a pre-written script. Do not fill your slides with copious text and bullet points. Make a point to show images and discuss them.

The presentation must place your selected research article in a broader scientific context, as evidenced by the reference to at least 5 additional articles published in scientific journals. Citations may be in any style, for example: Author (Year) *Journal*.

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

These recordings can be made using any software. Zoom is an easy option. You must submit your selected article for approval (via Canvas) by Thursday, November 9th. Final video assignment is due on Friday, December 8th.

Grading. Your responsibilities in this course are to (i) read the weekly articles, (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 or asynchronous writing assignment (25%), and final video presentation (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 an in-class 10-12 minute PowerPoint-style presentation on an assigned article. This presentation will provide a concise overview of the study and its motivations, design, and findings. This in-class presentation will constitute 20% of your grade (and all other graded pieces will be rescaled to 20%). 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	Research Articles	Additional Readings
October 2	Welcome: Contagion	–	
October 9	Introduction to Epidemiology	*Contagion* (Film) Luby 2006	
October 16	Introduction to Phylogenetics	Fox Lewis 2022* Keita 2021*	Baum 2005
October 23	Advanced Phylogenetics	Worobey 2016*	Pybus 2009
October 30	R_0	Dudas 2018*	
November 6	Virulence	Wymant 2022*	Fraser 2014 Wertheim 2022
November 13#	Epidemic Intelligence Service		Cohen 2014 Bjork 2023
November 20#	SIR Models	Pekar 2022	
November 27	Adaptive Immunity and Vaccines	Worobey 2014* Kustin 2021*	
December 4	Ancient Infections	Duggan 2016* Wagner 2014*	

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

I anticipate that class the weeks of November 13th and November 20th will be held virtually via Zoom

Only Research Articles and *Contagion* require recorded questions and written responses

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