



Summer Internship in Applied Molecular Epidemiology

<b>Academic Year</b>	2024		
<b>Course Number:</b>		<b>Type</b>	<b>Contact Hours</b>
TBD		LEC/SEM	120
<b>Course Title:</b>		LAB/PRE-CLINIC	0
Applied Molecular Epidemiology		CLINIC	
<b>Responsible Department:</b>		INDEPENDENT STUDY	
MCG Department of Pathology		<b>Total Contact Hours</b>	120
<b>Type of Instruction:</b>		<b>Total credits</b>	N/A
Lecture/Supervised Laboratory	<b>For courses that span semesters:</b>		
<b>BOR Instruction Method:</b>		<b>Fall</b>	<b>Spring</b>
Technology Enhanced			
<b>Course Concept Level:</b>	<b>Semester:</b>	Summer	
Introductory	<b>Semester Sequence Number:</b>		
<b>Catalog Description:</b>			
<p>The Summer Internship in Applied Molecular Epidemiology is a six-week, lecture and supervised lab course designed to provide undergraduates with “behind the scenes” access to workflows in a clinical pathology laboratory during an infectious disease outbreak. The program aims to generate interest in the multifaceted career opportunities available in molecular epidemiology, laboratory science, and bioinformatics as they relate to contemporary threats to public health.</p> <p>The internship offers foundational knowledge of epidemiology, hands-on molecular laboratory testing, and bioinformatics/computational tools for interpreting pathogen genomic data. Students will work closely with professors and laboratory technicians with a wealth of experience in genomic sequencing, COVID-19 testing, and molecular epidemiology. Students will engage in daily lecture and discussion sessions followed by technical laboratory training sessions. The program will culminate with talks from a variety of professionals in applied molecular epidemiology about their career paths as well as 15-minute presentations from the students on their selected pathogen outbreak analysis.</p>			



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Course Director	Office	Phone	Email
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SPH Lecturer	AU SPH		

**Attendance Policy:**

Your attendance is critical to your success. Attendance is mandatory at all lecture and laboratory sessions. If you miss a lecture or laboratory session, are late or leave early by more than 10 minutes, you must provide an excuse.

**Laboratory Attire:**

For your safety, laboratory dress code requires students working with hazardous substances wear closed-toe shoes and long pants or skirts which fully cover your legs. Long hair or loose jewelry should be contained. Your lab coat and other personal protective equipment will be provided to you and you must wear them while in the laboratory.

**Grading Model:**

Summer internship students are provided an opportunity to apply their molecular epidemiological training to current, real world pathogenic threats to public health. Students may select a pathogen from the CDC Current Outbreak List (<https://www.cdc.gov/outbreaks/index.html>) to research and analyze for a 15-minute presentation at the end of the internship. Sufficient mentoring and time will be provided during lecture sessions for students to complete their project. Students will



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receive feedback on their submissions which may be referenced for composing letters of recommendation.

As a student, you should demonstrate the following characteristics which include, but are not limited to:

- 1) being prepared and dressed appropriately for the laboratory,
- 2) working independently,
- 3) working efficiently (completing work on time),
- 4) accepting feedback
- 5) being attentive during presentations and participating appropriately in class discussions and
- 6) working with faculty and peers to create an effective learning environment.

<b>Dates</b>	<b>Lecture</b>	<b>Lab</b>	<b>Staff</b>	<b>Objective</b>
	Introduction and instructions Pre-assessment AME for infectious diseases discussion Introduction to Epidemiology (SPH) Introduction to Outbreaks Pathogen Murder Mystery	Initial Chemical Safety Training Biosafety Training Laboratory orientation (pipetting, mock PCR set up) Bench: Observe and practice	Kolhe Jones Navarre Sevilla Farmaha Mondal SPH	Week 1 – Origins Understand the scope of the course, complete required trainings, and recognize how epidemiology is used to investigate outbreaks.
	Laboratory preparation in a pandemic Sample collection Basic Microbiology Application of PCR in molecular diagnostics	Pathogen agnostic MinION Nucleic acid isolation Library preparation	Jones Mondal Vashist	Week 2 – From Sample Understand the fundamentals of DNA isolation and sequencing preparation for newly acquired samples.
	Genomics for emerging pathogens	NGS Day 1	Jones	Week 3 – To Sequence



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	Sequencing (Path Elective) Designing test-specific primers in silico	NGS Day 2 SARS-CoV-2 in ELISA	Mondal	Students will observe the NGS workflow and practice isolation techniques.
	Why genomic epidemiology? Data in gen epi BV-BRC Cleaning raw data, identification, serotyping Interpreting results and comparison genomes	Nextstrain Nextclade <a href="#">MicrobeTrace</a>	Veytsel Stott Ahluwalia	Week 4 – Making Sense of Data Describe the types of data in genomic epidemiology and how to interpret them. Engage in data visualization tutorials to create phylogenetic trees.
	Basics of genomic epi Treebuilding and interpretation Outbreak investigation Pathogen evolution	Nextstrain Nextclade <a href="#">MicrobeTrace</a>	Veytsel Stott Ahluwalia	Week 5 – Phylogenetic analysis Engage in data visualization tutorials to create phylogenetic trees. Identify the applications, advantages, and challenges of variant taxonomic classification. Observe real-time tracking of pathogen evolution.
	Career pathways US National Guard Bioinformatician and CDC data scientist Molecular laboratory technician Student presentations Post-assessment	Field epi mobile testing with MinION Histology and immunochemistry	Kolhe Jones Veytsel Stott Ahluwalia Caspary	Week 6 – Careers Hold discussions about various career opportunities in molecular epidemiology and share student presentations on outbreak analyses.