



## **BISC 499 Insidious Pandemics: Viral and Bacterial Antibiotic Resistance**

**2 Units**

**Fall 2025**

**Tuesdays and Thursdays 11:00 AM – 11:50 AM**

**Location: RRI 121**

**Instructor: Dr. Myron F. Goodman**

Professor, Biological Sciences and Chemistry

**Office: RRI 304A**

**Office Hours: Fridays 11:00 AM – 12:00 PM and/or by appointment**

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### **Course Description**

Insidious Pandemics will explore existential challenges to humanity and the various ways by which societies respond to impending disasters. Examples include past pandemics, black plague and polio, the recent Covid-19 pandemic, and an incipient pandemic, bacterial multidrug resistance. Specific topics to be discussed include bacteria, viruses, pathogenesis, mutations, vaccines, antibiotics and antibodies. Strategies used to design vaccines will be discussed along with standard statistical methods used to evaluate vaccine efficacy. There's seldom ever a "free lunch"; virtually every upside comes with a downside. "Follow the Science", a current cliché, will be discussed, by looking at Cost/Benefit ratios as a benchmark to analyze pro-vs anti-vax issues currently roiling our U.S. society.

### **Learning Objectives**

"Follow the Science" is a common cliché that has evolved into a catchphrase to support completely contradictory positions on fundamental societal challenges. Our main learning objectives will be to analyze how to follow the science when having to face the threats and consequences of viral (Covid, AIDS) and bacterial (pathogenic multidrug resistance) pandemics. Our most important learning objective is to develop critical thinking skills. Critical thinking requires knowing the science. To follow the science, a student will learn basic aspects of bacteria, viruses, antibodies and vaccines. We will learn basic statistical concepts to allow us to evaluate the pros and cons of vaccination strategies. Why does polio still exist? Why does measles persist? We will discuss societal pressures that introduce a strong subjective component into the "Follow the Science" mantra. This course puts a lot on the table with quite a lot to chew on, but these topics weaved together are designed to be tasty, digestible, and intellectually nourishing.

### **Prerequisite(s)**

The only pre-requisites for this course are intellectual curiosity and a healthy dose of skepticism.

### **Required Readings and Supplementary Materials**

Required readings will encompass primary source materials such as topical articles from newspapers, scientific journals (e.g., Science, Nature), the internet, and parts of books, e.g., "The Double Helix" – JD

Watson; “Radiant Science Dark Politics” – MD Kamen; “Lawrence & Oppenheimer”, NP Davis. These materials will be provided to the students as course material files on Brightspace.

### Description and Assessment of Assignments

There will be reading assignments for each week, typically general knowledge articles and essays specifically relevant to each topic. Students will participate in discussions and presentations aimed at exploring the intersection of Science, Politics, and Society in response to existential threats posed by pandemics, past, present, and future.

Each class session will include a formal lecture covering the fundamentals of each topic. The formal presentations will be available to students on Brightspace prior to each class. Each class session will include formal student presentations and informal discussions based on topical questions posed by the instructor and by the students.

The final two sessions including the final exam session will be devoted to formal student presentations on topics agreed upon by the instructor and students.

A paper (~ 3 pages, double spaced text, standard font 11 or 12 pt) will serve as a formal graded written assignment. The topics will be selected by each student in consultation with the instructor. The students will be strongly encouraged to write the papers solely by themselves with no input from artificial intelligence programs. Published sources can be used with proper attribution.

### Grading Breakdown

**Table 1 Grading Breakdown**

Assessment Tool (assignments)	Points	% of Grade
In-class discussions	30	30
Final Student Presentations	40	40
Written paper	30	30
<b>TOTAL</b>	100	100

### Grading Scale

[The following is an example of what a grading scale might look like. Check with your department or school for the recommended grading scale.]

Course final grades will be determined using the following scale:

**Table 2 Course Grading Scale**

Letter grade	Corresponding numerical point range
A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

### **Assignment Submission Policy**

The written assignment can be presented to the instructor prior to or on the Final Exam day.

### **Classroom policy**

Any other electronic communication devices (phones, blackberries, and similar) must be turned off, and no instant messenger/chat type programs are allowed in class.

### **Academic Integrity**

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

## Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonesty and is strictly prohibited. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

## Course Schedule

**Table 3 Course schedule**

	<b>Topics/Daily Activities</b>	<b>Readings/Preparation</b>	<b>Deliverables</b>
<b>Week 1</b>	1. Course Overview 2. Covid emergence – health, political & scientific consequences	Wild poliovirus makes comeback in Afghanistan and Pakistan, L Roberts, Science 2024	M Goodman Lecture
<b>Week 2</b>	1. Central Dogma (decentralized a bit) 2. Bacteria, bacterial & human viruses	Molecular Biology Mini-module, M Goodman;	M Goodman Lecture
<b>Week 3</b>	1. Whys & wherefores of vaccines 2. Pfizer analysis of vaccine efficacy	Global withdrawal of Sabin oral poliovirus type 2 vaccine in 2016, R Molodecky, R. Sutter Science 2025	M Goodman Lecture Student one-page double spaced essay in response to week 3 questions on Brightspace
<b>Week 4</b>	1. Follow the science – Lies, damned lies & statistics 2. Basic Statistical tools – what you really need to know at the very least	Statistics mini-module, M Goodman, P Calabrese	M Goodman Lecture
<b>Week 5</b>	1. Viral pandemics – Black plague + more 2. Genius of Pasteur, Fleming serendipity	Lessons from ancient pathogens, M Zuckerman & Hofman C, Science 2024; Phage predation, disease severity, and pathogen genetic diversity in cholera patients, E Nelson et al, Science 2024	M Goodman Lecture Student oral presentations on week 5 topics specified on Brightspace

<b>Week 6</b>	1. Why don't you die when I sneeze? 2. Adaptive immunity in humans	The counterattack, J Couzin-Frankel, Science 2024	M Goodman Lecture
<b>Week 7</b>	1. Sloppy vs dishonest science 2.No class - Fall Break	Fauci strikes at disinformation agents, M Hiltzik, LA Times 2024; When Ideology Eclipses Science, RT Pennock, Amer Sci 2024 Stanford to play host to fringe COVID theorists, M Hiltzik, LA Times 2024	M Goodman Lecture Student oral presentations on week 7 topics specified on Brightspace; Student one-page double spaced essay in response to week 7 questions on Brightspace
<b>Week 8</b>	1. The saga of Didier Raoult & others 2. Bacterial pathogens	When pseudoscience infects public discourse, M Hiltzik, LA Times; Raoult hydroxychloroquine hoax, S Sayare, NYTimes 2020	M Goodman Lecture General class discussion on poor vs dishonest science
<b>Week 9</b>	1. How do bacteria acquire drug resistance? 2. How do mutations contribute to drug resistance?	Antibiotic tolerance facilitates the evolution of antibiotic resistance, N Balaban, Science 2017	M Goodman Lecture Student one-page double spaced essay in response to week 9 topics specified on Brightspace
<b>Week 10</b>	1. Mutations – randomness “Trumps” 2. Biochemical basis of mutations	Mutation mini-module, M Goodman	M Goodman Lecture Student oral presentations on week 10 topics specified on Brightspace
<b>Week 11</b>	1. U.S. response to Covid-19 pandemic 2. U.S. response to pathogenic bacteria impending pandemic	Why does COVID-19 vaccine protection quickly wane? J Cohen, Science 2024	M Goodman Lecture General class discussion on cost/benefit ratio associated with vax or no-vax
<b>Week 12</b>	1. No class – Veterans Day 2. Looking back to the future	The promise of mRNA vaccines, D Kwon, The Scientist 2020; Phage therapy, D Kviatkovsky et al, Science 2023	M Goodman Lecture Student oral presentations on week 12 topics specified on Brightspace
<b>Week 13</b>	So called “science” under Hitler & Stalin vs under Roosevelt	M Kamen, Radiant Science Dark Politics 1985 ; N Davis, Lawrence & Oppenheimer, 1968	M Goodman Lecture General class discussion Consequences of restrictions placed on unfettered scientific inquiry
<b>Week 14</b>	1. What's Now & what's next? 2. No class – Thanksgiving	Trust in science fell as political split persisted, poll finds, LA Times 2023	M Goodman Lecture Student one-page double spaced essay in response to week 14 topics specified on Brightspace
<b>Week 15</b>	Current existential challenges to free scientific inquiry	Student oral presentations on main take-home lessons from course	Student oral presentations on main

			take-home lessons from course
<b>FINAL</b>	Student Written & Oral Presentations	A paper (~ 3 pages, double spaced text, standard font 11 or 12 pt) will serve as a formal graded written assignment. The topics will be selected by each student in consultation with M. Goodman	Refer to the final exam schedule in the USC <i>Schedule of Classes</i> at <a href="http://classes.usc.edu">classes.usc.edu</a> .

## Statement on University Academic and Support Systems

### Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](http://osas.usc.edu) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

### Student Financial Aid and Satisfactory Academic Progress:

To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the [Financial Aid Office webpage](#) for [undergraduate](#)- and [graduate-level](#) SAP eligibility requirements and the appeals process.

### Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-2500

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.