

Special Topics in Medical Sciences

“Science of COVID-19”

Course Syllabus

Last updated: 1/3/21

MEDS 3010: Special Topics in Medical Sciences - Science of COVID-19 (1-3 Credit Hours)

Spring Semester 2021

Mandatory Lectures: Mondays (M), 5:25-6:25P

Optional Open Discussion Time: Wednesdays (W), 4:25-5:25P

Faculty Course Directors:

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Course Description & Learning Objectives

This seminar course provides a broad overview of the global COVID-19 pandemic, with topics ranging from basic mechanisms of infection to clinical management to public health and medical ethics. Each weekly lecture will be led by a guest lecturer who is an expert in the respective discipline. Students will be expected to actively participate throughout the discussion by reviewing the assigned pre-readings, formulating well-informed questions, and engaging in short weekly discussion boards prior to each class. This course is ideal for upper-level undergraduates, medical students, and graduate students in the biomedical sciences. An additional and unique objective of this course is to provide recordings of all lectures for public viewing on the website of the University of Cincinnati College of Medicine Major in Medical Sciences. We hope these lectures will serve as an enriching and free resources for members of the local, regional, and national community to expand their knowledge of the evolving COVID-19 pandemic.

Seminar Topics and Learning Objectives

Virology & Pathogenesis of COVID-19 and SARS-CoV-2 Infection

- How is SARS-CoV-2 transmitted?
- Explore the cellular mechanisms of SARS-CoV-2.
- Define the symptoms of COVID-19.
- Why do certain features (old age, obesity, diabetes) convey increased risk?
- Discuss the long-term sequelae of COVID-19.

Do You Smell That?: Loss of Taste and Smell in COVID-19

- Why is loss of taste and/or smell a primary symptom in SARS-CoV-2 infection?
- How is loss of smell and taste used in the detection and diagnosis of COVID-19?
- Describe the epidemiology, clinical course, and prognosis of loss of taste and smell in COVID-19.
- Explore the emerging research about the physiology of chemosensory dysfunction in COVID-19.
- How does smell and taste loss resulting from COVID-19 influence quality of life?

Detecting the Virus: Development, Approval, and Production of COVID-19 Diagnostic Tests

- How are COVID-19 diagnostic tests developed, approved, and produced on a large scale and expedited timeline?
- Explore the basic science of PCR-based and antibody tests.
- In what ways did bottlenecks in production and distribution/access to tests occur early in the pandemic?
- How has COVID-19 diagnostic testing improved since the beginning of the pandemic?

Social Inequality as a Risk Factor: Disparities in Outcomes Among COVID-19 Patients

- How does someone's race/ nationality/ socioeconomic status impact their risk of contracting COVID-19 and subsequent outcomes?
- Explore how the COVID-19 crisis is deepening pre-existing social inequality and healthcare disparities.
- Discuss approaches that health care providers, public health experts, and health systems can take to address inequity and build trust within their community.

Can We Eradicate COVID-19 through Vaccinations?

- Explore the history of vaccine development.
- How do vaccines work?
- How are they tested, and approved?
- Define the currently available vaccines under development for COVID-19.
- Compare and contrast the mechanisms of action, advantages, and disadvantages of vaccines against COVID-19.
- Smallpox is the only disease to be eradicated via vaccination, can we eradicate COVID-19?

Clinical Trials, Vaccines, and Children: Impact of COVID-19 on Pediatric Health

- What are the phases of development and clinical trials of vaccines for infectious diseases like COVID-19?
- What are the COVID-19 vaccine candidates that have been tested at Cincinnati Children's and/or the University of Cincinnati and what role did our community play in the evaluation of these vaccines?
- How was the traditional vaccine development timeline and FDA approval process modified to develop the COVID-19 vaccine?

- Explore the obstacles and potential solutions to implementing a national vaccine program in the United States.
- Describe the epidemiology, clinical course, and prognosis of COVID-19 in pediatric patients.
- How does the epidemiology, clinical course, and prognosis of COVID-19 differ in pediatric and adult patients?
- What is Multisystem Inflammatory Syndrome and why does it affect children infected by SARS-CoV-2?

When Pandemic Hits: Intensive Care Management of COVID-19 Patients

- Discuss the standard-of-care for COVID-19, including supportive care measures.
- What further steps are being taken in intensive care units (ICUs) to prevent the spread of COVID-19?
- Explore the ICUs protocol for COVID-19 and the effectiveness of PPE.
- How were PPE protocols designed and implemented in the ICU to meet the needs of frontline workers?
- What is the role of critical care ultrasound in the diagnosis and treatment of patients with COVID-19?
- What patient populations are commonly being seen in the ICUs and why?
- What are the challenges (e.g., resources, time, emotional toll) that the COVID-19 pandemic has placed on frontline workers and ICUs, and how have these evolved throughout the course of the pandemic?

The Psychosocial Impacts of the COVID-19 Crisis

- How has the COVID-19 pandemic increased the number of psychological manifestations throughout all levels of society?
- In what ways has treating patients for psychological manifestations changed over the course of this pandemic?
- What groups of people are being more adversely affected than others?
- Explore the newly proposed psychosocial prevention and intervention models.

Biomedical Engineers: Lung Ultrasound for COVID-19

- What roles have biomedical engineers played in addressing PPE and medical equipment shortages?
- What advantages does ultrasound provide over other imaging modalities?
- How do ultrasound images differ between a healthy patient and a patient with COVID-19?
- Through the lens of lung ultrasound technology, what medical devices are on the horizon for the prevention, diagnosis, and/or treatment of COVID-19?

Flattening the Curve: Epidemiology and Public Health of the COVID-19 Pandemic

- What public health precautions mitigate the spread of SARS-CoV-2? How does contact tracing work?
- How are COVID-19 cases and outcomes tracked on the regional, national, and international level?
- How have individual health care institutions worked together to share best practices and develop cohesive care plans during the pandemic?
- Discuss how public health experts and providers interface with the government to monitor cases and implement public health guidelines during the COVID-19 pandemic.
- What strategies do public health experts use to communicate evidence-based information with the general public, especially when that information is rapidly changing and often competing with misinformation?

Not Just the Lungs: Neurological Manifestations of COVID-19

- Describe the neurological symptoms present in some COVID-19 patients.
- How can diagnostic tests and imaging be used to assess neurological problems?
- Describe the long-term neurological sequelae seen in some COVID-19 patients.
- Why do some patients present with “brain fog” and fatigue following COVID-19 infection?
- What is the relationship between strokes and COVID-19?
- How has the COVID-19 pandemic affected the care of patients with neurological disease?

Ethics of a Pandemic: Ethical Decision-Making in the Face of COVID-19

- Discuss the unique ethical dilemmas that have arisen during the COVID-19 pandemic, including but not limited to: testing and vaccine distribution, allocation of scarce treatments, mask ordinances, PPE availability, and providers’ duty to treat.
- Explore the tension between autonomy and collectivism in relation to public health crises.
- What ethical decision-making models do providers/institutions use when allocating limited resources (ventilators, testing, ICU beds, etc) during a pandemic?

Tackling the Virus: Targeted Therapeutics against COVID-19

- What are the most promising drugs (antivirals, anti-inflammatory agents, convalescent plasma, monoclonal antibodies, etc.) for the treatment of COVID-19, and what are their mechanisms of action?
- How has the FDA approval process for therapeutics been accelerated during the pandemic?
- Explore how scientists and clinicians access evidence-based data during a rapidly changing crisis.

Course Schedule

Week	Date	Lecture Name	Guest Lecturer	Assignments
1	M, 1/11	Introduction to Course	Student Course Directors	Discussion Board 1
	W, 1/13	Open Discussion Session		
2	M, 1/18	No Lecture Martin Luther King Jr. Day	None	None
3	M, 1/25	Virology & Pathogenesis of COVID-19	William Miller, PhD	Discussion Board 2
	W, 1/27	Open Discussion Session		
4	M, 2/1	Loss of Taste and Smell in COVID-19	Ahmad Sedaghat, MD, PhD	Discussion Board 3
	W, 2/3	Open Discussion Session		
5	M, 2/8	Diagnostic Testing for COVID-19	Maggie Powers-Fletcher, PhD	Discussion Board 4
	W, 2/10	Open Discussion Session		

6	M, 2/15	COVID-19 Vaccine Design	Alison Weiss, PhD	Discussion Board 5
	W, 2/17	Open Discussion Session		
7	M, 2/22	Effects of Social Inequality During the COVID-19 Pandemic	Tamika C. Odum, PhD	Discussion Board 6
	W, 2/24	Open Discussion Session		
8	M, 3/1	Vaccine Trials and Pediatric Manifestations of COVID-19	Robert Frenck Jr., MD	Discussion Board 7
	W, 3/3	Open Discussion Session		
9	M, 3/8	Intensive Care Management of COVID-19 Patients	Michael Hellmann, MD	Discussion Board 8
	W, 3/10	Open Discussion Session		
10	M, 3/15	Psychosocial Impacts of the COVID-19 Crisis	TBD	Discussion Board 9
	W, 3/17	Open Discussion Session		
11	M, 3/22	Biomedical Engineering and Lung Ultrasound for COVID-19	Kevin Haworth, PhD	Discussion Board 10
	W, 3/24	Open Discussion Session		
12	M, 3/29	Epidemiology and Public Health of COVID-19	Andrew F. Beck, MD, MPH	Discussion Board 11
	W, 3/31	Open Discussion Session		
13	M, 4/5	Neurological Manifestations of COVID-19	Pooja Khatri, MD	Discussion Board 12
	W, 4/7	Open Discussion Session		
14	M, 4/12	Ethical Decision-Making During the COVID-19 Pandemic	Holly Bante, PhD Catherine Sherron, PhD	Discussion Board 13
	W, 4/14	Open Discussion Session		
15	M, 4/19	Targeted Therapeutics for COVID-19	Paul Spearman, MD	Discussion Board 14
	W, 4/21	Open Discussion Session		
	F, 4/23	Final Reflection Paper		Final Course

				Reflection (due by 11:59 PM)
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Prerequisites

Students are recommended (but not required) to have successfully completed course(s) in genetics, biochemistry, and/or physiology. This course will investigate concepts that assume a basic knowledge in these disciplines. Students should speak to their academic advisor about enrolling in this course if the recommended prerequisites have not been met.

Lecture & Open Discussion Session

All lectures and open discussion sessions will be conducted virtually through WebEx. Links to WebEx events for each week's lectures and open discussion sessions can be found on Canvas under the corresponding week's module. WebEx calendar invitations have also been sent to all students enrolled in the course as of 1/2/21. Please contact one of the Student Course Directors if you did not receive a WebEx calendar invitation and would like one. All lectures will be live streamed via YouTube Live, recorded, and posted to the website of the Medical Sciences Program for public enrichment. **By joining each week's WebEx session, you are consenting to be recorded.**

Every Monday, faculty members from the University of Cincinnati or Cincinnati Children's Hospital Medical Center will deliver a lecture on COVID-19 from a molecular, clinical, or humanistic perspective. These faculty members are experts in their respective areas of the evolving COVID-19 pandemic and have generously volunteered their time to share their knowledge with our course. **Therefore, it is expected that all students will attend and actively participate in each Monday's lecture. If an emergency or other unforeseen circumstances arises which prevent a student from attending a Monday lecture, it is the responsibility of the student to email the Student Course Directors and let them know of the absence.** It is up to the Student Course Directors' discretion as to whether the absence is excused and what steps must be taken in order for the student to remediate the lost attendance at that session. Unexcused absences will result in a reduction in the students' attendance and participation grades.

Every Wednesday, during the open discussion session, time will be set aside for students to discuss course topics amongst their fellow students. During this self-guided session, students can be expected to review the course material for upcoming lectures, collaborate to formulate strong scientific questioning on the assigned readings and discuss pertinent topics related to the COVID-19 pandemic. This self-guided session will be optional for all students and student course directors may not be present for this session.

If any questions arise during this time and a student course director is not present, please contact one of the Student Course Directors per our communication policy.

Grading & Assignments

Students will be expected to prepare for each week's lecture by completing the assigned pre-work and discussion board for each class session. Pre-work could include reading a scientific article, watching a video, or listening to a podcast that is pertinent to the week's material and assigned by the week's invited lecturer. A discussion board will be opened immediately following lectures asking students to critically analyze the pre-work material and lecture according to a guiding prompt. **The discussion board for a given lecture must be completed by 11:59 PM on the Sunday prior to the lecture. Successful and timely completion of Discussion Boards will comprise 50% of the final course grade. Individually, each of the 14 Discussion Boards will contribute towards 3.57% of the final grade.**

Attendance and participation in all Monday lectures will be assessed as 10% and 15% of the final course grade, respectively. Students who attend all lectures (barring excused absences) and ask ≥ 2 questions throughout the semester will receive a full 25% for attendance and participation grades. Students may ask questions at the end of each lecture or during the lecture by un-muting and speaking or typing into the WebEx chat as directed by the invited lecturer. Excused absences will be evaluated at the Student Course Directors' discretion and must be reported to the Student Course Directors by email at least 24 hours in advance of the missed lecture.

The final assessment will consist of a reflection paper of approximately 2-3 pages over a topic or experience that relates to one of the lecture topics presented during the course. We encourage students to choose a topic that considers COVID-19 from a molecular, clinical, or humanistic perspective. All students are encouraged to choose a topic of personal interest that relates to the material discussed in the course and describe how they will use the information they learned from the course moving forward as they navigate life during the COVID-19 pandemic. **The final reflection paper must be submitted to Canvas by 11:59 PM on Friday, April 23, 2021 and will be worth 25% of the final course grade.**

Assignment	Percentage of Final Grade	Submission Deadline
Discussion Board 1	3.57%	Sunday, 1/10 by 11:59 PM
Discussion Board 2	3.57%	Sunday, 1/24 by 11:59 PM
Discussion Board 3	3.57%	Sunday, 1/31 by 11:59 PM
Discussion Board 4	3.57%	Sunday, 2/7 by 11:59 PM

Discussion Board 5	3.57%	Sunday, 2/14 by 11:59 PM
Discussion Board 6	3.57%	Sunday, 2/21 by 11:59 PM
Discussion Board 7	3.57%	Sunday, 2/28 by 11:59 PM
Discussion Board 8	3.57%	Sunday, 3/7 by 11:59 PM
Discussion Board 9	3.57%	Sunday, 3/14 by 11:59 PM
Discussion Board 10	3.57%	Sunday, 3/21 by 11:59 PM
Discussion Board 11	3.57%	Sunday, 3/28 by 11:59 PM
Discussion Board 12	3.57%	Sunday, 4/4 by 11:59 PM
Discussion Board 13	3.57%	Sunday, 4/11 by 11:59 PM
Discussion Board 14	3.57%	Sunday, 4/18 by 11:59 PM
Final Reflection Paper	25.00%	Friday, 4/23 by 11:59 PM
Attendance at Monday Lectures	10.00%	Assessed throughout semester
Participation at Monday Lectures	15.00%	Assessed throughout semester

Grading

MEDS 3010: Special Topics in Medical Sciences - "Science of COVID-19" will be offered as a 1-3 credit hour course during the Spring Semester of 2021. The intention of this course to emphasize student learning about a relevant topic and deemphasize the stress that may be associated with grading in an advanced course. Grade cutoffs are below and will be determined based on students' participation in the course, attendance at all Monday lectures, and completion of assignments by the assigned due date.

Grade	Percentage
A	90-100%
B	80-89.9%
C	70-79.9%
D	60-69.9%
F	50-59.9%

Audit and Withdrawal Policy

There is no audit option for this course. Please follow the UC guidelines for withdrawal from the course:

http://www.uc.edu/registrar/policies_and_procedures/withdrawal_procedures.html.

Communication Policy

For concerns about course assignments, lectures, and absences, please contact any of the Student Course Directors at the emails provided at the beginning of this syllabus. For other additional concerns about the course, please email Drs. Miller or Menon.

Attendance Policy

Since the majority of learning will occur during lectures, it is important that students prioritize weekly class attendance. Participation of all students is expected. In the case of an emergency or to request an excused absence, please email one of the Student Course Directors as soon as possible. Except in extenuating circumstances, more than two unexcused absences from the weekly lecture (Monday lecture) will result in a failing grade.

Academic Integrity Policy

The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university-related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct: <http://www.uc.edu/studentlife/conduct>.

Diversity, Equity, and Inclusion Statement

The University of Cincinnati embraces diversity, equity, and inclusion as core values that empower individuals to transform their lives and achieve their highest potential. The University of Cincinnati recognizes a very broad and inclusive concept of diversity that includes commonly recognized considerations such as race, ethnicity, gender, age, disability status, socioeconomic status, gender identity and expression, sexual identity, sexual orientation, religion, and regional or national origin. Inclusion authentically brings traditionally excluded individuals and/or groups into processes, activities, and decision making.

The course directors are committed to the fundamental principles of academic freedom and human dignity, especially within the above context. All participants in the course are asked to commit to creating and fostering a positive learning environment based on open communication, mutual respect, and

inclusion. If there are aspects of the course design, instruction, and/or experiences that result in barriers to your inclusion, participation, or the accurate assessment of your achievement, contact the course directors.

Accessibility & Accommodations

- **Accessibility:**

If you have any accessibility needs related to course participation (visual/hearing, physical, communication, or learning impairments), you should meet with the instructor prior to the start of class to arrange for reasonable provisions to meet course requirements. Some accommodations may require prior approval by UC Accessibility Resources.

Students with accessibility needs who require academic accommodations or other specialized services while attending the University of Cincinnati will receive reasonable accommodations to meet their individual needs as well as advocacy assistance on accessibility-related issues. Students requiring special accommodation must register with the Accessibility Resources Office (<https://www.uc.edu/campus-life/accessibility-resources/resources.html>). Students registered with this office must request accommodation from the faculty member in charge of the course during the first week of classes or within one week of their registration with the Accessibility Resources Office.

- **Counseling Services:**

Students have access to counseling and mental health care through the University Health Services (UHS), which can provide both psychotherapy and psychiatric services. In addition, Counseling and Psychological Services (CAPS) can provide professional counseling upon request; students may receive five free counseling sessions through CAPS without insurance. Students are encouraged to seek assistance for anxiety, depression, trauma/assault, adjustment to college life, interpersonal/relational difficulty, sexuality, family conflict, grief and loss, disordered eating and body image, alcohol and substance abuse, anger management, identity development and issues related to diversity, concerns associated with sexual orientation and spirituality concerns, as well as any other issue of concerns. After hours, students may call UHS at 513-556-2564 or CAPS Cares at 513-556-0648. For urgent physician consultation after-hours students may call 513-584-7777.

- **Title IX:**

Title IX is a federal civil rights law that prohibits discrimination on the basis of your actual or perceived sex, gender, gender identity, gender expression, or sexual orientation. Title IX also

covers sexual violence, dating or domestic violence, and stalking. If you disclose a Title IX issue to any faculty member, we are required to forward that information to the Title IX Office. They will follow up with you about how the University can take steps to address the impact on you and the community and make you aware of your rights and resources.

The Title IX office priority is to make sure you are safe and successful at UC.

You are not required to talk with the Title IX Office. If you would like to make a report of sex or gender-based discrimination, harassment, or violence, or if you would like to know more about your rights and resources on campus, you can consult their website (<https://www.uc.edu/about/equity-inclusion/gender-equity.html>) or contact the office at 556-3349. If you wish to speak with someone who is not required to report to the Title IX office, you can visit the Women Helping Women office located at 559 Steger Student Life Center (513-431-1563). (<https://www.womenhelpingwomen.org/home/services/campus-based-advocacy/>)