

Course #:	PHYS 4393 / CRN 36252, PHYS 5393 / CRN 36315
Course Title:	Special Topics in Physics, Subtopic: <i>The Coronavirus Disease 2019 (COVID-19) Pandemic</i>
Credit Hrs:	3.0
Term:	Summer 2020, June 8 – July 31, 2020
Course Meetings & Location:	Mon Wed Fri 12:00PM – 1:30 PM, ONLINE
Instructor:	Dr. José Leo Bañuelos
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Office Hrs:	Virtual: MWF:1:30 pm – 2:00 pm, and by appointment
Materials:	TBD

Grading/Assessment

Q1: Individual Research summary:	20%
Q2: Team Summaries, draft 1:	25%
Q3: Rough Draft submission:	20%
Q4: Final Project	15%
Weekly reports	10%
Guest Speaker	5%
-Prepare to ask at least one question during talk, and provide ½ page summary of discussion.	
Participation/attendance	5%

Short Summary. In this course, students will conduct research to develop innovative solutions to help solve current societal challenges. The grand challenge for summer 2020 course offering is: *The Coronavirus Disease 2019 (COVID-19) Pandemic*. The primary product to be delivered by the end of the course is a well-developed team proposal to address an aspect of the main problem, or a well-tested prototype in which the team demonstrates the feasibility of their approach. Students will research an aspect of the challenge independently, form a team, and develop and deliver their solution. The instructor will deliver introductions to important aspects of the challenge, lectures on current experimentally available tools, and guidance on conducting scientific literature searches, scientific communication (writing and presentations), and working in teams.

Detailed General Description. In this course, students will conduct research to develop innovative solutions to help solve current societal challenges. Each course offering, the professor will present the grand challenge for the course. The primary product to be delivered by the end of the course is a well-developed team proposal to address an aspect of the main problem, or a well-tested prototype in which the team demonstrates the feasibility of their approach.

In this student-led course, students will learn how to interpret information obtained from public news sources and to obtain background information from relevant and reliable sources of information including peer-reviewed scientific literature. In this course, students will leverage their existing strengths by working in student teams.

During the first quarter of the course, students will independently research a specific aspect of the societal issue. The professor will provide examples of the complexity of the problem and offer potential topics to research. Each student will independently select an initial topic and the professor will share the list of each student's topic with the rest of the class. Regular meetings (virtual or in-person) will consist of student updates on their findings and discussions, as well as instructor lectures that introduce students to both traditional and cutting-edge analytical techniques or technology applications that may be relevant to the grand challenge, and methods to carry out scientific literature searches/summaries. The course material will include professor lectures, links to websites with critical information, and sharing of research articles. Students will present summaries of their topic, including its relevance to the grand challenge, their findings, and how they think their expertise can contribute.

Q1: Major Assignments (20%):

Individual summary

During the second quarter, At this time, students will form teams, brainstorm ways to combine their efforts, and develop a roadmap for their proposal/demonstration development. The instructor will provide guidance on team-forming, working in teams, offer guidance on proposal development, and help answer technical questions about their proposed solutions in a dynamic, student-led manner. Guest subject-matter experts, either from UTEP or other institutions, may be invited to deliver short presentations on specific student-requested topics in which the instructor may not be an expert.

Q2: Major assignments (25%):

- SMART goals worksheet
- Team summary outline
- Specific Aims page
- Review of other team specific aims page

Q3: During the third quarter, students will prepare the first draft of their proposal/ demonstration. Students will be expected to have regular meetings and provide the instructor with a summary of the meetings in a format specified by the instructor.

Q3: Major assignments (20%):

Team oral presentations

Submission of Project Rough Draft

Review of 2 other team rough drafts

Q4: From the end of the third to beginning of the fourth quarter, teams will deliver their draft full proposal in written format as well as an oral presentation. The instructor, as well as the other teams, will provide critiques of the proposals. During the remainder of the course, students will make changes to their drafts, taking into account the feedback from the rest of the class, and submit their final proposal /demonstration.

Q4: Major Assignments (15%):

Student Participants. This course will be available to any upper level undergraduate student at UTEP as well as graduate students (crosslisted with PHYS 5393), but will be geared toward students in the department of physics. Students from other Colleges & Schools must request permission to enroll directly from the instructor.

Impacts. This course has the potential to positively impact individual students, the quality of research and ability to secure external funding at UTEP, public awareness of societal challenges, and serve as a model for departments at other institutions of higher learning.

Overview of summer 2020 questions. The grand societal challenge for summer 2020 will be the coronavirus disease 2019 (COVID-19) pandemic. We will consider questions such as:

1. Description

- What is COVID-19?
- What environments allow it to thrive?
- How does it survive in the atmosphere and on surfaces?

Resources:

<https://coronavirus.jhu.edu/map.html>

2. Detection of the disease

- what is the current state of the art
- availability of technology
- symptomatic vs asymptomatic patients

3. How can we stop it?

- Are there innovative ways to stop COVID-19 while it's "in transit", i.e., in the air or on surfaces?
- What are the challenges we face when informing the public about the disease and preventive measures?
 - What can be done to improve this communication?
 - Tools to reach the masses.
 - Role of science/scientists in politics
- Vaccines: Big Data Science / Computational Tools approaches?

4. Once patients become infected:

- What are the current care protocols?
- What types of equipment do care-givers need?
- Can such equipment be developed using off-the-shelf components?

MIT: <https://e-vent.mit.edu/>Rice: <http://oedk.rice.edu/apollobvm/>Vanderbilt: <https://news.vanderbilt.edu/2020/03/27/vu-engineers-and-vumc-doctors-team-up-for-open-source-ventilator-design/>

Summer 2020 Guest Speaker Schedule

Fri, June 12	Dr. Shafik Dharamsi Dean of College of Health Sciences, UTEP	<i>Social Interdependency – Implications for COVID19</i>
Mon, June 15	Dr. Lin Li Assistant Professor of Physics, UTEP	<i>Protein-protein interactions play important roles when Covid-19 virus infects human cell</i>
Wed, June 24	Dr. Ogechika Alozie Chief Medical Officer, Del Sol Medical Center	<i>COVID19 – Landing the Plane</i>
Mon, June 29	Dr. David Zubia Professor of Electrical and Computer Engineering, UTEP	<i>Math modeling of phenomena: a COVID-19 example</i>
Mon, July 6	Dr. Holly Mata Public Health Specialist, Health Equity Advocate	<i>Public Health Perspectives: Racism, Politics, and COVID-19</i>
Mon, July 20	Dr. Pasquale Fulvio Research Professor, Dept. of Nuclear Engineering, Texas A&M University	<i>From energy storage to biosensors: supercapacitor electrode materials and electrolytes for selective CoV-2 detection</i>
Wed, July 22	Dr. Suman Sirimulla School of Pharmacy, UTEP	<i>Drug Discovery for Treatment of COVID-19</i>

Academic Integrity Policy:

A fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at The University of Texas at El Paso. More specifically, students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University.

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an

examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Please see: <https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html> for more information and the UTEP Handbook of Operating Procedures: <https://www.utep.edu/vpba/hoop/>

Civility Statement:

Cell phones and pagers should be turned off during class time.

When absences occur, it is your responsibility to obtain handouts and notes from your peers.

When possible you will complete the activities you have missed.

Academic integrity is to be practiced at all times.

Disability Statement:

If you have a disability and need classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East Building, Room 106. For additional information, please visit the CASS website at <https://www.utep.edu/student-affairs/cass/>. The student is responsible for presenting to the instructor any accommodation letters and instructions.

Military Statement:

If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact the instructor at the beginning of the semester.