Course Syllabus: Contemporary Topics in Bioengineering - BioE 394

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<tr>
<th>Division</th>
<th>Biological and Environmental Sciences &amp; Engineering Division</th>
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<tbody>
<tr>
<td>Course Number</td>
<td>BioE 394</td>
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<tr>
<td>Course Title</td>
<td>Contemporary Topics in Bioengineering</td>
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<tr>
<td>Academic Semester</td>
<td>Summer</td>
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<tr>
<td>Academic Year</td>
<td>2019/2020</td>
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<tr>
<td>Semester Start Date</td>
<td>05/31/2020</td>
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<tr>
<td>Semester End Date</td>
<td>07/23/2020</td>
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<tr>
<td>Class Schedule</td>
<td>10:00 AM - 12:00 PM</td>
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Instructor(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Office Location</th>
<th>Office Hours</th>
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</thead>
<tbody>
<tr>
<td>Charlotte Armgard Emmy Hauser</td>
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<td>+966128082524</td>
<td>4219, 2, Ibn Al-Haytham (bldg. 2)</td>
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Teaching Assistant(s)

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<tr>
<th>Name</th>
<th>Email</th>
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Course Information

Comprehensive Course Description

The course covers major topics on coronaviruses and the current global epidemic of the virus SARS-CoV-2, most commonly known as COVID-19. The fast spread of the virus creates a need to understand the basics of epidemiology and virology. Understanding the viral pathogenesis will allow us to design and develop effective tools to control its spread, treat it, and prevent its future return. We will discuss the key scientific underpinnings of evidence-based outbreak control methods. This course should give an overview on the current state in SARS-CoV-2 diagnostics and the research undergoing to develop new diagnostics such as CRISPR and ELISA detection tools. Also, we will have additional focus on the financial impact and life after the epidemic.

Course Description from Program Guide

A course of current interest. Topics are not permanent and the content of the course will change to reflect recurring themes and topical interest. The content will be approved by the division.

Goals and Objectives

This course aims to provide students with the fundamentals and principles behind epidemiology and virology, specifically related to the novel SARS-CoV-2. The student will have an understanding of the crucial binding and inhibition interactions of SARS-CoV-2 with the immune system and prospect therapeutic targets. The students will learn about state-of-the-art vaccines and detection systems, as well as analytical tools for the detection and analysis of viral particles.

Required Knowledge

Sufficient knowledge in Molecular Biology and Cell Biology

Reference Texts


Method of evaluation

40.00% - Final exam
40.00% - Midterm exam
20.00% - Active participation

Nature of the assignments

Oral presentations, at least 2 presentations, have to be prepared summarizing a recent research paper (two 20-30 minute presentation, including questioning/answers)
<table>
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<tr>
<th>Week</th>
<th>Lectures</th>
<th>Topic</th>
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| 1    | Mon 06/01/2020  
Tue 06/02/2020  
Thu 06/04/2020 | Mon: Introduction to viruses and COVID-19 - Prof. Hauser  
Tue: Viruses structure, classification, proliferation, and replication - Prof. Hauser  
Thu: Pathogenesis: Entry gates and pathways for spread - Prof. Hauser |
| 2    | Mon 06/08/2020  
Tue 06/09/2020  
Thu 06/11/2020 | Mon: Immunity, inflammation and intervention in COVID-19 - Prof. Hauser  
Tue: How can we stop epidemics? Lessons from history and COVID-19 - Prof. Hauser  
Thu: Modelling the pandemic and its interventions - Prof. Hauser |
| 3    | Mon 06/15/2020  
Tue 06/16/2020  
Thu 06/18/2020 | Mon: Overview of molecular diagnostics methods: PCR methods and future development (Pending Approval) - Prof. Samir Hamdan  
Tue: Sequencing and informatic tools used for the analysis of possible target therapies (Pending Approval) - Prof. Takashi Gojobori  
Thu: Viral evolution and mutational landscape (Pending Approval) - Prof. Robert Hoehndorf |
| 4    | Mon 06/22/2020  
Tue 06/23/2020  
Thu 06/25/2020 | Mon: Student presentations: Topics TBD (Midterm presentation)  
Tue: Student presentations: Topics TBD (Midterm presentation)  
Thu: Student presentations: Topics TBD (Midterm presentation) |
| 5    | Mon 06/29/2020  
Tue 06/30/2020  
Thu 07/02/2020 | Mon: Immunodiagnostics to detect COVID-19 - Prof. Hauser  
Tue: CRISPR/Cas-related diagnostics(Pending Approval) - Prof. Mahfouz  
Thu: Spike proteins across strains: overview - Prof. Hauser |
| 6    | Mon 07/06/2020  
Tue 07/07/2020  
Thu 07/09/2020 | Mo: Unraveling the global genetic signatures of the SARS-CoV-2 virus (Pending Approval) - Prof. Arnab Pain  
Tue: Vaccines and COVID-19 - Prof. Hauser  
Thu: Receptor recognition and binding by SARS-CoV-2 - Prof. Hauser |
| 7    | Mon 07/13/2020  
Tue 07/14/2020  
Thu 07/16/2020 | Mo: Current treatment options and future developments - Prof. Hauser  
Tue: How to open up and how to live after the Pandemic - Prof. Hauser  
Thu: Student presentations: Topics TBD (Final presentation) |
| 8    | Mon 07/20/2020  
Tue 07/21/2020  
Thu 07/23/2020 | Mo: Student presentations: Topics TBD (Final presentation)  
Tue: Student presentations: Topics TBD (Final presentation)  
Thu: Mental health in times of COVID-19 (Pending Approval) - KAUST Counseling (Janet Camp and Nabil Salibi) |

**Note**
The instructor reserves the right to make changes to this syllabus as necessary.