



INTRODUCTION TO ENGINEERED CELLULAR SYSTEMS FOR THE PHARMACEUTICAL INDUSTRY

Enrollment year	2019/2020
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-IND/34 (INDUSTRIAL BIOENGINEERING)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	3°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	75 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	PASQUALINI FRANCESCO (titolare) - 6 ECTS
Prerequisites	Good understanding of the English language.
Learning outcomes	<p>A recent trend in Pharmaceutical R&D is the validation of cell culture models that can help develop personalized therapies. Engineered cell culture platforms, such as organoids or organs-on-chips, can provide such predictive power and are good opportunities for students in biomedical engineering to enter the Biotech and Pharma job markets.</p> <p>In this introductory course, students will learn the fundamentals of cell mechanics and micro/nano-fabrication needed for the creations of Hearts-on-chips platforms</p> <p>This course, which will be given by a faculty member recently returned from the Harvard University Wyss Institute (where organs-on-chips were</p>

	<p>invented), has the following objectives:</p> <ol style="list-style-type: none"> 1. To become familiar with the main applications in the pharmaceutical industry of: <ul style="list-style-type: none"> o Mechanobiology o Organs-on-chips 2. To understand the theoretical framework behind these disciplines 3. To be able to critically evaluate scientific publications in this field 4. To be able to communicate analytically and synthetically the progress in this field 5. To be able to network with other experts in this field
Course contents	<ol style="list-style-type: none"> 1. Understanding drug RnD in Biotech and Pharma (7.5 hrs of lectures) 2. Basic notions of cell biology (7.5 hrs of lectures) 3. Basic notions in statistical and solid mechanics (7.5 hrs of lectures) 4. Introduction to Cardiac mechanobiology (7.5 hrs of lectures) 5. Introduction to the cell contractile apparatus (22.5 hrs of lab activities) 6. Introduction to mechano-transduction (22.5 hrs of lab activities)
Teaching methods	<p>Flipped classroom:</p> <ul style="list-style-type: none"> - Selected book chapters - Classroom discussion - Laboratory activities
Reccomended or required readings	<p>The material will be selected by the instructor from the following books:</p> <p>Jacobs, C. R. Introduction to Cell Mechanics and Mechanobiology. (ISBN-13: 978-0815344254)</p> <p>- Nelson P. Biological Physics. Energy, Information, Life. (ISBN: 978-0578695471)</p> <p>- Hang, J; Bocard, D; Peitisch M. C.. Organ-on-a-chip: Engineered Microenvironments for Safety and Efficacy Testing. (ISBN: 978-0128172025)</p>
Assessment methods	written exam + optional interview
Further information	
Sustainable development goals - Agenda 2030	\$lbl legenda sviluppo sostenibile