

IAU Faculty of Medicine

Course Name: MED105 GENETICS and MEDICAL BIOTECHNOLOGY

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Office Hours: Drop by when you want to ask a question at my office or send me an email.

Course Description Medical Biotechnology, with the growth in Genetic Engineering technology and the advancement of research in Biotechnology, is experiencing rapid growth in recent years. This natural science field leads to the opportunities in the development of innovative technologies to improve human health through the prevention, diagnosis and treatment of genetic diseases. In this line, Medical Biotechnology that has revolutionized the health system combines engineering technologies with biological sciences to regulate systems and living organisms. Genome sequencing, cloning, stem cell research and gene therapy combined with CRISPR/Cas9 technology are the most important benefits of genetic engineering that make this field indispensable in the modern world.

Course Aim The course aims to teach advanced lessons in the biological processes meant for medical biotechnology and other purposes. During the course the concept of medical biotechnology and its connections with human genetic diseases will be covered systematically from central dogma of genetics and then generalizing with the recent applications in biotechnology with special topics. A unique aspect of this course is its focus on biotechnology in medicine.

Recommended Books

- Th. William & M. Palladino. Introduction to Biotechnology. San Francisco: Pearson/Benjamin Cummings, 2004.
- Nicholl, D. An Introduction to Genetic Engineering, 3th Cambridge: Cambridge University Press. (2008).
- G. B. Schaefer and JN Thompson Jr. Medical Genetics. McGraw-Hill Professional (2014).
- D.L. Hartl. *Genetics: Analysis of Genes and Genomes*. Jones & Bartlett (2011).

Homework One homework will be given during the course hours.

Examinations There will be one midterm exam covering half of topics taught in the course, and a final examination on a whole lecture of medical biology and genetics.

Grading: Your final grade of the course will be calculated according to the following table:

Activity	Percent of Total Grade
Homework	% 30
Midterm	% 30
Final Exam	% 40

COURSE SCHEDULE				
Day 1	Day 2	Day 3	Day 4	Day 5
The Biotechnology Century and Its Workforce	An Introduction to Genes and Genomes	Genetic Engineering: Recombinant DNA Technology	Proteins as Final Products of Genes	Medical Biotechnology and Its Applications
Day 6	Day 7	Day 8	Day 9	Day 10
Special Topics: Cancer Genetics Epigenomics Pharmacogenomics	Bioinformatics Tools Gene Primer Design Cloning and Sequencing	The Greatest Discovery: The Human Genome Project Special Topic: SARS-CoV-2 Genome Databases	Special Topic: Gene Therapy and CRISPR/Cas9 Technology	Ethics and Medical Biotechnology

Course Outcome

- Understand Basic Concepts of Genetics and Medical Biotechnology
- Learn Recombinant DNA Technology
- Learn Genetic Engineering Technology Applied in Medical Biotechnology
- Gain knowledge in Genome sequencing, cloning and gene therapy, CRISPR/Cas9 technology

Attendance Minimum 70% attendance to lecture sessions are necessary as required by the university regulations. Failure to do so will result in a grade NA and those students will not be allowed into Final Examination.

ECTS: The course will provide 4 ECTS for successful participants.

Requirements Basic Genetics and Computer Skills

Participation Limit 10 Students

Additional Remarks This document contains brief summary of all the rules for this class. You are advised to read detailed syllabus in the course web page.

Class Policies:

Homeworks: There are two different sets, for 30% of the final grade; assigned on Friday and must be turned-in the following Friday. Term exams: One in-class exams, 30% each of the final grade; each borrows heavily from Homework sets. Final exam: 40% of the final grade; covers all the material.