

Course title	Precision and Personalized Medicine				
Course code	MCB670				
Course type	Elective				
Level	Master's (2nd Cycle)				
Year / Semester	1st Year / 2nd Semester				
Teacher's name	TBA				
ECTS	10	Lectures / week	3 Hours/14 weeks	Laboratories / week	None
Course purpose and objectives	The main objective of the Precision and Personalized Medicine course is to introduce the next generation approaches of cancer medicine, based on the individual's genetic profile, which aim to provide significant benefits to patients over traditional therapeutic strategies.				
Learning outcomes	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Recognize the basic principles for applying data from human genome to cancer medicine • Describe the major -omics technologies currently used in personalized cancer medicine • Discuss the use of next-generation sequencing for developing personalized anti-cancer therapeutic approaches • Describe how transcriptomics (i.e RNA-sequencing, gene expression microarrays) and proteomics (i.e. mass spectrometry) can be applied for precision medicine. • Differentiate and compare the use of biological information from genomic, transcriptomic and proteomic datasets for personalized therapy in cancer. • Interpret big data information to evaluate the efficacy of targeted anti-cancer therapies • Evaluate big data results from omics studies as for their potential in cancer biomarker and therapeutic target discovery • Discuss the use of cancer biomarkers in diagnosis and therapy. • Discuss applications of pharmacogenetics and pharmacogenomics in novel personalized drug development in cancer research • Discuss the principles and advantages of drug repurposing • Discuss ethical issues related to personalized cancer medicine • Interpret applications of whole-genome sequencing for personalized cancer medicine • Interpret applications of transcriptomics and precision cancer medicine • Interpret applications of epigenomics in personalized cancer medicine • Interpret Quantitative proteomics in personalized cancer therapy • Translate genome information into clinical practice during cancer therapy • Comprehend involvement of big data and translational bioinformatics in precision and personalized cancer medicine • Be up-dated on current targeted therapies for major types of human cancer 				

	<ul style="list-style-type: none"> • Interpret applications of pharmacogenetics/pharmacogenomics and precision anti-cancer drug development • Discuss drug repurposing and repositioning in cancer therapy • Interpret Clinical Use of biomarkers as diagnostic tools for cancer • Discuss ethical social, regulatory and financial considerations for personalized cancer medicine • Discuss and estimate the future of personalized cancer medicine 		
Prerequisites	None	Co-requisites	None
Course content	<p>Description:</p> <p>Theory:</p> <ul style="list-style-type: none"> • Principles for applying human genome information to clinical practice • Basic technologies for developing personalized cancer medicine • Analysis and Data Organization • Combining Annotation of Nodes with Network Topology • Deterministic vs. Stochastic Systems • Analysis of Directed Graphs, Regulatory Motifs in Cancer Cell Signaling Networks • Integrated Reasoning: Merging Bottom Up and Top Down Reasoning • From Model Predictions to Laboratory Experiments <p>Practicals:</p> <ul style="list-style-type: none"> • Analysis of omics studies and their results, recently published, and their value in the discovery of cancer prognostic/predictive 		
Teaching methodology	Face-to-face		
Bibliography	<p>An Introduction to Systems Biology: Design Principles of Biological Circuits, 2nd ed. (ebook) Uri Alon, Chapman and Hall/CRC https://www.ebooks.com/en-cy/book/209687886/an-introduction-to-systems-biology/uri-alon/</p> <p>Systems Biology: A Textbook, (ebook), Edda Klipp, Wiley https://www.wiley.com/en-ie/Systems+Biology%3A+A+Textbook%2C+2nd+Edition-p-9783527675678</p> <p>A First Course in Systems Biology, (ebook), Eberhard Voit, Garland Science https://www.ebooks.com/en-cy/book/209908253/a-first-course-in-systems-biology/eberhard-voit/</p> <p>Fundamentals of Systems Biology: From Synthetic Circuits to Whole-cell Models (ebook), Markus W. Covert, CRC Press https://www.ebooks.com/en-cy/book/1864042/fundamentals-of-systems-biology/markus-w-covert/</p> <p>Systems Biology of Cancer (ebook), Sam Thiagalingam, Cambridge University Press https://www.ebooks.com/en-cy/book/1873546/systems-biology-of-cancer/sam-thiagalingam/</p>		

Assessment	Mid-Term Examination	30%
	Final Examination	40%
	Oral presentations/Assignments	20%
	Class participation and attendance	10%
	Total	100%
Language	English	