Course Unit Descriptor

Study Programme: Master Academic Studies in Biochemistry

Course Unit Title: Cell culture in biochemistry

Course Unit Code: IB-508

Name of Lecturer(s): Associate Professor Marija Lesjak, Associate Professor Ivana Beara

Type and Level of Studies: Master of Science Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 5

Prerequisites: None

Course Aims: The goal of the course is to provide students with theoretical knowledge and practical skills in animal cell lines maintaining and their applications in the examination of mechanisms of biochemical processes, as well as the biological activities of isolated and synthesized products. Furthermore, the goal of the course is to develop student's ability to independently select the appropriate method and cell culture as a biological substrate for examining the biochemical mechanisms and biological potential of the selected substrates.

Learning Outcomes: Upon successful competition of the course student should be able to: (1) understand the use of different animal cell lines in biochemical research, (2) show creativity in selecting methods and cell lines as a biological substrate for the examination of the biological mechanisms and potential of isolated and synthesized products (3) make their own conclusions about the possible mechanisms of investigated biological process, or action of isolated and synthesized products in corresponding biological process, depending on the results of experiments in which they used different cell lines as a substrate, (4) recognize laboratory equipment and techniques used for cell cultures maintaining, (5) independently apply the appropriate experimental procedures during work with cell cultures, (6) independently process data, critically present the results and conclude.

Syllabus:

Theory

The main types of animal cell cultures. Laboratory equipment for animal cell cultures maintaining. Aseptic techniques practised in laboratory for cell culture. Types and selection of culture media for growing cells. Cell lines contamination. Basic methods in cell cultures maintaining: subculturing, isolation, counting, determination of cell viability and cell preservation (cryopreservation). Characterisation, transformation, cloning and selection of cell lines. The principle of selecting the appropriate cell lines for bioassays. Investigation of the effect of natural products and synthesised compounds on growth, proliferation, metabolism and apoptosis of cell lines. Methods for monitoring cell responses. Selected examples of in vitro methods based on cell cultures as a biological substrate.

Practice

Introduction to the laboratory for cell cultures and aseptic techniques. Subculturing, isolation, counting, determination of cell viability and cell preservation (cryopreservation). Cell cultures maintaining. Monitoring the cytotoxicity of selected plant extracts, isolated and synthesized compounds on the selected cell line.

Required Reading:

1. Freshney, RI. (2010): Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, John

Willey & Sons, Hoboken, NJ, USA.
2. Davis, JM. (2011): Animal cell culture: Essential Methods, John Wiley & Sons Ltd, Chichester, UK.
3. Masters, JRW. (2000): Animal Cell Culture: A Practical Approach, Oxford University press, NY, USA.
4. Relevant scientific papers from the field

Weekly Contact Hours: 4 (60)	**Lectures:** 2 (30)	**Practical work:** 2 (30)

Teaching Methods: Lectures, laboratory work, consultations, e-learning

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	60
Practical work	15	oral exam	
Preliminary exam(s)	/	…….	
Seminar(s)	15		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.