Course Unit Descriptor

Study Programme: Bachelor Academic Studies in Biohemistry, Bachelor Academic Studies in Chemistry - Quality Control and Environmental Management

Course Unit Title: Applied Biochemistry

Course Unit Code: IB-602

Name of Lecturer(s): Assistant professor Emilija Svirčev

Type and Level of Studies: Bachelor 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 objective of the course is to provide the students with novel overview of the use of biotechnological processes (the use of microbial, animal or plant cells, or enzymes) for the production of specific products from different row materials. Students obtain the competence to evaluate two main features of biotechnology: its connections with practical applications and interdisciplinary cooperation.

Learning Outcomes:

Knowledge and comprehension of the use of various enzymes, microorganisms, animal/plant cells for technological purposes. The obtained knowledge is applicable in different fields of healthcare, plant and animal agriculture, solving many environmental problems, the conservation and recycling of resources, in creation of specific molecular converters (bioreactors) and novel fermenters to optimise productivity. Use of literature, data collection and interpretation, oral and written reporting.

Syllabus:

Theory

Safety in biotechnology, social, moral and ethical considerations on genetic engineering; documentation. Intellectual property: publishing and patenting. Industrial enzyme preparations: screening sources, preparation of biological material, production optimization. Large-scale preparation of technical enzymes, methods (homogenisation, centrifugation, filtration, biphasic systems, cell breakage, chromatographies). Immobilized enzymes: economic aspects, coupling methods, examples. Enzymes on the market: food industry (starch processing, vegetable and fruit processing, brewing industry, juice- and winemaking, enzymes for dairy products and animal feed), laundry detergents, tanning industry, textile industry, paper industry, food analysis. Genetic engineering. Biosensors. Biotechnology in medicine: clinical use of enzymes, determination of enzyme activities for clinical diagnosis, examples of enzymes in different diseases; biopharmaceuticals; gene therapy; stem cells biotechnology. Role of enzymes in the remediation of polluted environments.

Practice

Visit to selected factories / laboratories where traditional and / or modern technological solutions involving enzymes and other biomolecules are applied. Writing and presenting a mini-project on the selected topic.

Required Reading:

1. Smith J. E.: Biotechnology, Fifth Ed. Cambridge University Press, Cambridge, UK, 2009

<table>
<tr><td colspan="4">2. Aehle W.: Enzymes in Industry: Production and Application, 3rd ed. Willey-Vch, 2007
3. Borém A., Santos F., Bowen D.: Understanding biotechnology, Prentice Hall PTR, 2003</td></tr>
<tr><td colspan="2">Weekly Contact Hours: 4</td><td>Lectures: 2</td><td>Practical work: 2</td></tr>
<tr><td colspan="4">Teaching Methods: Lectures, laboratory work, seminar (s)</td></tr>
<tr><td colspan="4">Knowledge Assessment (maximum of 100 points): 100</td></tr>
<tr><td>Pre-exam obligations</td><td>points</td><td>Final exam</td><td>points</td></tr>
<tr><td>Active class participation</td><td>5</td><td>written exam</td><td></td></tr>
<tr><td>Practical work</td><td>10</td><td>oral exam</td><td>65</td></tr>
<tr><td>project presentation</td><td>20</td><td>…….</td><td></td></tr>
<tr><td>Seminar(s)</td><td></td><td></td><td></td></tr>
<tr><td colspan="4">The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.</td></tr>
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