

Course: Biochemical engineering		
Language: English		
Lecturer: Assoc. prof. Ana Vrsalović Presečki, PhD, Assoc. prof. Zvezdana Findrik Blažević, PhD		
TEACHING	WEEKLY	SEMESTER
Lectures	2	30
Laboratory	1	15
Seminar		
		Overall: 45
		ECTS: 5
<p>PURPOSE: To introduce students into the field of biochemical engineering and to show them the features and possibilities of biological material through examples of industrial practice.</p>		
<p>THE CONTENTS OF THE COURSE:</p> <p>1st week Introduction (definition and the area of biochemical engineering, chemical and biochemical engineering - similarities, specialties and differences).</p> <p>2nd week Basic definitions: bioprocess, biotransformation, fermentation, biosynthesis, cell metabolism.</p> <p>3rd week Biocatalysis</p> <p>4th week Kinetics of enzyme catalyzed reaction (Michaelis-Menten). Kinetics of biological reactions (Monod). Mass balances. Yield. Estimation of kinetic constants.</p> <p><u>Laboratory:</u> numerical problems -enzyme kinetic parameter estimation</p> <p>5th week Biocatalysts (stability, activity). Shapes and production</p> <p>6th week Immobilized enzymes.</p> <p>7th week Mass transfer phenomenon in bioprocesses (k_La). Measurement and control in biological processes.</p> <p><u>Laboratory:</u> numerical problems –volumetric oxygen mass transfer coefficient estimation</p> <p>8th week 1st test</p>		

9th week Bioreactors (enzyme reactors, fermentors). Macrokinetics of biological processes. (Apparent stability of biocatalysts).

Laboratory: numerical problems –simulation of bioprocess in different type of reactors

10th week Enzyme membrane reactor

11th week Design and analysis of bioreactors. Mixing. Multiphase systems.

12th week Downstream processing

13th week Bioseparation processes; cell disruption, bioproduct separation.

14th week Overview on industrial biotransformations. Industrial application of enzyme catalysis.

15th week 2nd test

GENERAL AND SPECIFIC COMPETENCE:

Acquiring basic knowledge of chemical engineering methodology needed to solve practical problems in the process analysis.

KNOWLEDGE TESTING AND EVALUATION:

1. Written and oral exam

MONITORING OF THE COURSE QUALITY AND SUCCESSFULNESS:

Student survey

LITERATURE:

1. Bailey, J. E., Ollis, D. F.: Biochemical Engineering Fundamentals. McGraw-Hill, 1986.
2. Scragg, A. (Ed.): Biotechnology for Engineers - Biological Systems in Technological Processes, Ellis Horwood Limited, Chichester, 1988.
3. van't Riet, K., Tramper, J.: Basic Bioreactor Design, M. Dekker, New York, 1991.
4. Blanch, H. W., Clark, D. S., Biochemical Engineering, Marcel Dekker, New York, 1996.