



Univerza v Mariboru
University of Maribor

Medicinska fakulteta
Faculty of Medicine



OPIS PREDMETA / SUBJECT SPECIFICATION

Predmet:	REOLOGIJA V BIOLOŠKIH SISTEMIH
Subject Title:	RHEOLOGY OF BIOLOGICAL SYSTEMS

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
BIOMEDICINSKA TEHNOLOGIJA BIOMEDICAL TECHNOLOGY		2	3 ali 4

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15	20		10		105	5

Nosilec predmeta / Lecturer:

Prof. Dr. Volker Ribitsch

Jeziki / Predavanja / Lecture:

English

Languages:

Vaje / Tutorial:

English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Kandidat mora doseči 300 ECTS na predhodnem študiju.

Graduate degree 300 ECTS

Vsebina:

Contents (Syllabus outline):

- Koncepti reologije
- Deformacije trdnih materialov
- Stacionarni eksperimenti v reologiji (stacionarni strig, lezenje, relaksacija)
- Oscilatorni eksperimenti v reologiji (odvisnost od frekvence in deformacije)
- Stiskanje, vlečenje in torzija trdnin
- Reološki modeli in osnovne enačbe
- Reologija krvi in rdečih krvnih celic
- Reologija sluzi
- Deformacije tkiva in hrustanca
- Deformacije kosti in zob

- Principles of rheology
- Rheology of particle solutions and network solutions
- Deformation of solid materials
- Stationary rheological experiments (stationary shear, creep, relaxation)
- Oscillatory rheological experiments (frequency and deformation dependence)
- Compression, elongation and torsion of solids
- Rheological models and constitutive equations
- Rheology of blood and red blood cells
- Rheology of mucus
- Deformation of tissue and cartilage
- Deformation of bones, teeth

Temeljni študijski viri / Textbooks:

- J. V. Edwards, T. L. Vigo, Bioactive fibres and Polymers, American Chemical Society, Washington, DC, 2001
- M. Szycher, High performance Biomaterials, A comprehensive guide to medical and pharmaceutical applications, Technomic Publishing Company Inc., 1991, Lancaster, USA
- J. Black, Biological Performance of materials, Marcel Dekker, Inc., New York, 1999
- K. Park, Controlled Drug Delivery. Challenges and Strategies, ACS professional reference book, 1997, Washington DC
- J. Richard, M. S. LaPorte, Hydrophilic Polymer Coatings for Medical Devices, Technomic Publishing Company Inc., 1997
- J. I. Gallin, I. M. Goldstein, R. Snyderman, Inflammation, Basic Principles and Clinical Correlates, Raven Press New York, 1992
- Sharma R.: Surfactant Adsorption and Surface Solubilization, Washington DC: American Chemical Society, 1995

- Parfitt, G.D.: Adsorption from Solution at the Solid/Liquid Interface; London: Academic Press, 1983.
- Ruthven, D.M.: Principles of adsorption and adsorption processes; New York [etc.]: John Wiley & sons, 1984
- Lyklema J.: Fundamentals of Interface and Colloid Science, Vol. 1: Fundamentals, London [etc.]: Academic Press, 1993
- Kitahara A., Watanabe A.: Electrical Phenomena at Interfaces; New York, Basel: Marcel Dekker inc., 1984
- Drew, M.: Surfaces, Interfaces and Colloids, Second Edition; New York [etc.]: John Wiley & Sons, 1999

Cilji:

Procesi deformacije.

Principi in metode reologije

Reološke lastnosti bioloških sistemov

Zvezo med strukturo in deformacijo

Razlogi za funkcijo samca v bioloških sistemih

Predvideni študijski rezultati:

Znanje in razumevanje:

Vedenje o deformacijah v bioloških sistemih pod naravnimi bremenami in aktivnostmi
Razumevanje mehanskih lastnosti in možne funkcije samca.

Prenesljive/ključne spretnosti in drugi atributi:
Študent osvoji znanje in razumevanje principov in metod reologije

Metode poučevanja in učenja:

Predavanja, individualno raziskovalno delo

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)
Ustno izpraševanje, seminarska naloga

Delež (v %) /
Weight (in %)

Objectives:

- Deformation processes
- Rheological principles and methods
- Rheological properties of different biological system
- Developing a structure - deformation properties relationship
- Reasons of male-function of biological systems.

Intended learning outcomes:

Knowledge of the deformation behaviour of biological systems under natural loads and natural activities.
Understanding of mechanical properties and possible male-function.

Transferable/Key Skills and other attributes:
Student occupies knowledge and understanding of principles and of procedures rheology

Learning and teaching methods:

Lectures, independent research

Assessment:

Type (examination, oral, coursework, project):
Oral examination, report

Materialni pogoji za izvedbo predmeta :

Predavanja in individualno raziskovalno delo se bo izvajalo v obstoječih prostorih in na obstoječi opremi.

Material conditions for subject realization

The lectures and individual research work will take place in the existing facilities using existing equipment.

Obveznosti študentov:

(pisni, ustni izpit, naloge, projekti)

Ustni izpit, seminarska naloga

Students' commitments:

(written, oral examination, coursework, projects):

Oral final exam, report