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| **Naziv predmeta** | | | | | **Kako napraviti vlastiti organ** | | | | | | | | | | |
| **Kod** | MFMI… | | Godina studija | | | 1,2,3,4 | | | | | | | | | |
| **Nositelj/i predmeta** | Doc. dr. sc. Sandra Kostić | | Bodovna vrijednost (ECTS) | | | 2 | | | | | | | | | |
| Suradnici | Izv.prof.dr.sc. Katarina Vukojević | | Način izvođenja nastave (broj sati u semestru) | | | P | | S | V | | | T |  | | |
| 10 | | 15 |  | | |  |
| Status predmeta | Izborni | | Postotak primjene e-učenja | | | 0 | | | | | | | | | |
| **OPIS PREDMETA** | | | | | | | | | | | | | | | |
| Ciljevi predmeta | Razumijevanje i usvajanje znanja o postupcima bioinženjerstva i proizvodnje regenerativnih bioloških materijala. | | | | | | | | | | | | | | |
| Uvjeti za upis predmeta i ulazne kompetencije potrebne za predmet | nema | | | | | | | | | | | | | | |
| Očekivani ishodi učenja na razini predmeta (4-10 ishoda učenja) | - Navesti i obrazložiti glavna područja u biotehnologiji  - Opisati osnovne karakteristike medicinske biotehnologije i navesti primjere unutar ovog polja  - Detaljno objasniti proces tkivnog inženjerstva: odabir stanica, bioreaktora i nosača potrebnih za bioinženjerstvo organa  - Identificirati i objasniti pozitivne i negativne strane korištenja matičnih stanica u tkivnom inženjerstvu  - Navesti etičke probleme vezane za bioinženjerstvo organa | | | | | | | | | | | | | | |
| Sadržaj predmeta detaljno razrađen prema satnici nastave | *Predavanja (10h):*- Uvod u biotehnologiju- Uvod u tkivno inženjerstvo- 3D printeri u biomedicini*Seminari (15h):*- Osnovni princip tkivnog inženjerstva – odabir stanica, nosača, bioreaktora- Bioinženjerstvo tkiva i organa kao alternativa lijekovima, genskoj terapiji i transplantaciji organa- Mogućnosti primjene kultura stanica za izradu tkiva i organa- Regenerativna medicina - primjena matičnih stanica- Najvažnija dostignuća u području bioinženjerstva umjetnih organa i njihov terapeutski potencijal - Proizvodnja specifičnih organa (tkiva): kože, hrskavice, kosti, srca, pluća, mokraćnog mjehura, spolnih organa… | | | | | | | | | | | | | | |
| Vrste izvođenja nastave: | ☐ predavanja  ☐ seminari i radionice  ☐ vježbe  ☐ *on line* u cijelosti  ☐ mješovito e-učenje  ☐ terenska nastava | | | | | ☐ samostalni zadaci  ☐ multimedija  ☐ laboratorij  ☐mentorski rad  ☐       (ostalo upisati) | | | | | | | | | |
|
| Obveze studenata | Nazočnost na nastavi 80% predavanja, 90% seminari i 100% vježbe | | | | | | | | | | | | | | |
| Praćenje rada studenata *(upisati udio u ECTS bodovima za svaku aktivnost tako da ukupni broj ECTS bodova odgovara bodovnoj vrijednosti predmeta):* | Pohađanje nastave |  | |  | | |  | | |  | | | | |  |
| Seminarski rad |  | |  | | |  | | | (Ostalo upisati) | | | | |  |
| Pismeni ispit |  | |  | | |  | | | (Ostalo upisati) | | | | |  |
|  |  | |  | | |  | | | (Ostalo upisati) | | | | |  |
|  |  | |  | | |  | | | (Ostalo upisati) | | | | |  |
| Ocjenjivanje i vrjednovanje rada studenata tijekom nastave i na završnom ispitu | Pisani ispit | | | | | | | | | | | | | | |
| Obvezna literatura (dostupna u knjižnici i putem ostalih medija) | **Naslov** | | | | | | | | | | **Broj primjeraka u knjižnici** | | | **Dostupnost putem ostalih medija** | |
| Moran EC, Dhal A, Vyas D, Lanas A, Soker S, Baptista PM. Whole-organ bioengineering: current tales of modern alchemy. Transl Res. 2014; 163(4):259-67.  Vacanti J. Tissue engineering and regenerative medicine: from first principles to state of the art. J. Pediatr. Surg. 2010;45(2):291–294.  Atala A. Regenerative medicine strategies. J. Paediat. Surg. 2012; 47:17–28.  Scarritt ME, Pashos NC, Bunnell BA. A review of cellularization strategies for tissue engineering of whole organs. Front Bioeng Biotechnol. 2015;3:43. | | | | | | | | | |  | | | *da* | |
| Dopunska literatura | Meyer U, Meyer TH, Handschel J, Wiesmann HP (2009) Fundamentals of Tissue Engineering and Regenerative Medicine, Springer, New York. | | | | | | | | | | | | | | |
| Načini praćenja kvalitete koji osiguravaju stjecanje utvrđenih ishoda učenja | -Analiza kvalitete nastave od strane studenata i nastavnika,  -Analiza prolaznosti na ispitima,  -Izvješća Povjerenstva za kontrolu provedbe nastave,  -Izvaninstitucijska evaluacija (posjet timova za kontrolu kvalitete Nacionalne agencije za kontrolu kvalitete, uključenje u TEEP). | | | | | | | | | | | | | | |
| Ostalo (prema mišljenju predlagatelja) |  | | | | | | | | | | | | | | |

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| **NAME OF THE COURSE** | | **How to construct your own organ** | | | | | | | | | | | | |
| **Code** | MFMI… | | | | Year of study | | | | 1,2,3,4 | | | | | |
| Course teacher | Assistant professor Sandra Kostić, PhD, MSc in Molecular Biotechnology | | | | Credits (ECTS) | | | | 2 | | | | | |
| Associate teachers | Associate professor Katarina Vukojević, MD, PhD | | | | Type of instruction (number of hours) | | | | L | S | | E | | T |
| 10 | 15 | |  | |  |
| Status of the course | Elective | | | | Percentage of application of e-learning | | | | 0 | | | | | |
| **COURSE DESCRIPTION** | | | | | | | | | | | | | | |
| Course enrolment requirements and entry competences required for the course | none | | | | | | | | | | | | | |
| Learning outcomes expected at the level of the course (4 to 10 learning outcomes) | Name and describe the main fields of biotechnology.  - Describe the main characteristics of medical biotechnology, and name the examples within this field.  - Explain the process of tissue engineering in detail; describe the main principle of choosing the components required for constructing an organ.  - Identify and explain the positive and negative sides of using stem cells in tissue engineering  - Describe the ethical concerns involved in construction of artificial organs | | | | | | | | | | | | | |
| Course content broken down in detail by weekly class schedule (syllabus) | - Introduction to biotechnology; biotechnology in biomedicine  - Introduction to tissue engineering  - The main principle of tissue engineering: choosing cells, scaffold and bioreactor  - Stem cells in tissue engineering: potential and problems with regenerative medicine; Ethical issues  - 3D printers in bioengineering  - Tissue engineering of specific organs  - The most relevant achievements in the field of bioengineering of artificial organs and their therapeutic potential  - Bioengineering of specific tissues and organs as an alternative to drugs, gene therapy and organ transplantation; Construction of the skin, cartilage, bone, heart, lungs, reproductive organs…; Analysis of the scientific articles | | | | | | | | | | | | | |
| Format of instruction | ☐ lectures  ☐ seminars and workshops  ☐ exercises  ☐ *on line* in entirety  ☐ partial e-learning  ☐ field work | | | | | ☐ independent assignments  ☐ multimedia  ☐ laboratory  ☐ work with mentor  ☐       (other) | | | | | | | | |
|
| Student responsibilities | In accordance to Rules of studying and Deontological code for USSM students. | | | | | | | | | | | | | |
| Screening student work *(name the proportion of ECTS credits for each* *activity so that the total number of ECTS credits is equal to the ECTS value of the course)* | Class attendance | |  | Research | | |  | Practical training | | | | |  | |
| Experimental work | |  | Report | | |  | (Other) | | | | |  | |
| Essay | |  | Seminar essay | | |  | (Other) | | | | |  | |
| Tests | |  | Oral exam | | |  | (Other) | | | | |  | |
| Written exam | |  | Project | | |  | (Other) | | | | |  | |
| Grading and evaluating student work in class and at the final exam |  | | | | | | | | | | | | | |
| Required literature (available in the library and via other media) | **Title** | | | | | | | | **Number of copies in the library** | | **Availability via other media** | | | |
| Moran EC, Dhal A, Vyas D, Lanas A, Soker S, Baptista PM. Whole-organ bioengineering: current tales of modern alchemy. Transl Res. 2014; 163(4):259-67. | | | | | | | |  | | online | | | |
| Vacanti J. Tissue engineering and regenerative medicine: from first principles to state of the art. J. Pediatr. Surg. 2010;45(2):291–294. | | | | | | | |  | | online | | | |
| Atala A. Regenerative medicine strategies. J. Paediat. Surg. 2012; 47:17–28. | | | | | | | |  | | online | | | |
| Atala A (2009) Engineering organs. Curr Opin Biotechnol 20: 575-592. | | | | | | | |  | | online | | | |
| Sheyn D, Mizrahi O, Benjamin S, Gazit Z, Pelled G, Gazit D. Genetically modified cells in regenerative medicine and tissue engineering. Adv Drug Deliv Rev. 2010; 62:683–98. | | | | | | | |  | | online | | | |
| Scarritt ME, Pashos NC, Bunnell BA. A review of cellularization strategies for tissue engineering of whole organs. Front Bioeng Biotechnol. 2015;3:43. | | | | | | | |  | | online | | | |
| Moran EC, Dhal A, Vyas D, Lanas A, Soker S, Baptista PM. Whole-organ bioengineering: current tales of modern alchemy. Transl Res. 2014; 163(4):259-67. | | | | | | | |  | | online | | | |
| Vacanti J. Tissue engineering and regenerative medicine: from first principles to state of the art. J. Pediatr. Surg. 2010;45(2):291–294. | | | | | | | |  | | online | | | |
| Optional literature (at the time of submission of study programme proposal) | Meyer U, Meyer TH, Handschel J, Wiesmann HP (2009) Fundamentals of Tissue Engineering and Regenerative Medicine, Springer, New York. | | | | | | | | | | | | | |
| Quality assurance methods that ensure the acquisition of exit competences | * Teaching quality analysis by students and teachers * Exam passing rate analysis * Committee for control of teaching reports * External evaluation | | | | | | | | | | | | | |
| Other (as the proposer wishes to add) |  | | | | | | | | | | | | | |