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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) |       |