Univerza v Mariboru

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Reproduktivna biologija in embriologija**
Course title:	**Reproductive Biology and Embryology**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biomedicinska tehnologija/Biomedical Technology 3. stopnja/3rd Degree		2	3 ali 4

Vrsta predmeta / Course type	Izbirni/Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. Vaje Tutorial	Lab. vaje work	Druge oblike študija	Samost. Delo Individ. Work	ECTS
15	10	10	15		105	5

Nosilec predmeta / Lecturer:	Izr. prof. dr. Borut Kovačič Prof. dr. Veljko Vlaisavljević

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski / Slovene
	Vaje / Tutorial:	Slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Kandidat mora doseči 300 ECTS na predhodnem študiju.	Graduate degree 300 ECTS

Vsebina:	**Content (Syllabus outline):**
Modo v fetusu, primordiale celice, spermatogeneza, Leydigove in Sertolijeve celice, zorenje, morfologija / zgradba semenčic, funkcija posameznih struktur, semenski izliv. Jajčnik v fetusu, primordialne celice, oogeneza, teka in granulozne celice, maturacija, folikulogeneza, morfologija in zgradba jajčne celice, delovanje posameznih struktur, Združitev spolnih celic. Embrionalni razvoj – med prvo delitvijo in implantacijo, poimplantacijska embriologija, nepravilnost razvoja zarodkov in vitro. Laboratorijske tehnike oploditve z biomedicinsko pomočjo (OBMP): različna gojišča, osnovna analiza semena in priprave semena za postopke IUI, IVF in ICSI, z morfološko oceno semena in razširjeno analizo semena, biopsija testisa. IVF in ICSI, fertilizacija, kultivacija zarodkov morfološke lastnosti, vitrifikacija, biopsija polarnega telesa, predimplantacijska genetska diagnostika.	The foetal testis, primordial cells, spermatogenesis, Leydig & Sertoli cells, sperm maturation, morphology/structure, function of each structure, semen sample. The foetal ovary, primordial cells, oogenesis, theca & granulosa cells, maturation, foliculogenesisi, oocyte morphology/structure, function of each structure. Gamete interaction. Embryo development - from first cleavage to implantation, post implantation embryology, abnormal development, embryos in vitro. Laboratory techniques of Medically Assisted Reproduction (MAR): different culture media, basic semen analysis, preparation of spermatozoa for IUI, IVF and ICSI procedure, assessment of sperm morphology, extended analysis of semen ejaculate, testicular biopsy, conventional in vitro fertilization (IVF), intracytoplasmatic sperm injection (ICSI), fertilization, cultivation of embryos and their morphology, vitrification, blastomere/polar body biopsy, preimplantation genetic diagnosis (PGD).

Temeljni literatura in viri / Readings:

- BREZNIK, Barbara, KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. The role and use of hyaluronan in reproductive medicine. V: POMIN, Vitor H. (ur.). ***Hyaluronan : biological and medical implications***, (Biochemistry research

trends). New York: Nova Science Publishers. cop. 2014, str. [113]-137, ilustr. [COBISS.SI-ID 5039167]

- KOVAČIČ, Borut, HOJNIK, Nina, VLAISAVLJEVIĆ, Veljko. The use of time lapse photography in an in vitro fertilization programme for better selection for embryo transfer. V: REYES, David (ur.), CASALES, Angelica (ur.). ***Embryo development : stages, mechanisms and clinical outcomes*****,** (Human reproductive system - anatomy, roles and disorders). New York: Nova Science Publishers. cop. 2013, str. [113]-139, ilustr. [COBISS.SI-ID 4728895]
- KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Importance of blastocyst morphology in selection for transfer. V: WU, Bin (ur.). ***Advances in embryo transfer***. Rijeka: InTech. cop. 2012, str. [161]-176. http://www.intechopen.com/books/advances-in-embryo-transfer/importance-of-blastocyst-morphology-in-selection-for-transfer. [COBISS.SI-ID 4271167]
- VLAISAVLJEVIĆ, Veljko, KNEZ, Jure, KOVAČIČ, Borut. Does the number of retrieved oocytes influence pregnancy rate after day 3 and day 5 embryo transfer?. V: WU, Bin (ur.). ***Advances in embryo transfer***. Rijeka: InTech. cop. 2012, str. [39]-52, ilustr. http://www.intechopen. com/books/advances-in-embryo-transfer/does-the-number-of-retrieved-oocytes-influence-pregnancy-rate-after-day-3-and-day-5-embryo-transfer-. [COBISS.SI-ID 4270911]
- VLAISAVLJEVIĆ, Veljko, KNEZ, Jure, KOVAČIČ, Borut. Does embryo transfer technique and personal experience influence pregnancy rate?. V: BERHARDT, Leon V. (ur.). ***Advances in medicine and biology***, (Advances in medicine and biology, ISSN 2157-5398, vol. 39). New York: Nova Science. cop. 2012, str. [237]-252. [COBISS.SI-ID 4324671]
- VLAISAVLJEVIĆ, Veljko, DOŠEN, Marko, KOVAČIČ, Borut. Embryo quality and pregnancy outcome in infertile patients with endometriosis. V: CHAUDHURY, Koel (ur.), CHAKRAVARTY, Baidyanath (ur.). *Endometriosis - basic* ***concepts and current research trends*****.** Rijeka: InTech. 2012, str. [383]-398. http://www.intechopen.com/books/endometriosis-basic-concepts-and-current-research-trends. [COBISS.SI-ID 4271935]
- KNEZ, Jure, KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Effectiveness of Slovenian health insurance reimbursement policy in twin's rate reduction in medically assisted reproduction. V: DUPONT, Maison (ur.), RENAUD, Jean-Pierre (ur.). ***Siblings : social adjustments, interaction, and family dynamics***, (Children's issues, laws and programs). New York: Nova Science Publisher's. cop. 2012, str. 125-140, ilustr. [COBISS.SI-ID 4454719]
- KRIŽANČIĆ BOMBEK, Lidija, KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Morphology and aneuploidy of in vitro matured (IVM) human oocytes. V: STORCHOVA, Zuzana (ur.). ***Aneuploidy in health and disease***. Rijeka: InTech. cop. 2012, str. [163]-192, ilustr.http://www.intechopen.com/books/aneuploidy-in-health-and-disease/aneuploidy-of-in-vitro-matured-ivm-human-oocytes. [COBISS.SI-ID4336447]
- KOVAČIČ, Borut. Culture systems : low-oxygen culture. V: SMITH, Gary D. (ur.), SWAIN, Jason E. (ur.), POOL, Thomas B. (ur.). ***Embryo culture : methods and protocols***, (Methods in molecular biology, ISSN 1940-6029, 912). New York [etc.]: Humana Press. cop. 2012, str. 249-272. http://www.springerlink.com/content/t7470461p7m4718h/fulltext.pdf. [COBISS.SI-ID 4375615]
- KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. The use of pentoxifylline for triggering the movement of testicular sperm before their use in intracytoplasmic sperm injection in men with azoospermia. V: LEJEUNE, Thomas (ur.), DELVAUX, Pascal (ur.). *Human* ***spermatozoa : maturation, capacitation and abnormalities***, (Human reproductive system - anatomy, roles, and disorders series). New York: Nova Science. cop. 2010, str. 355-378. [COBISS.SI-ID 3653951]
- KOVAČIČ, Borut. Oploditev z biomedicinsko pomočjo - laboratorijski del. V: TAKAČ, Iztok (ur.), et al. ***Ginekologija in perinatologija*****.** 1. izd. Maribor: Medicinska fakulteta. 2016, str. 196-205, ilustr. [COBISS.SI-ID 5670975]
- KOVAČIČ, Borut. Priprava semena za oploditev z biomedicinsko pomočjo. V: ZORN, Branko. ***Andrologija : moška neplodnost in kontracepcija, hipogonadizem, motnje spolnosti in staranja pri moškem***. Ljubljana: Medicinska fakulteta. 2014, str. 331-341, ilustr. [COBISS.SI-ID 4899903]
- KOVAČIČ, Borut. Cryopreservation - sperm TESE and MESA. V: RIZK, Botros (ur.), MONTAG, Markus (ur.). ***Standard operational procedures in reproductive medicine : laboratory and clinical practice*****,** (Reproductive medicine and assisted reproductive techniques series). Boca Raton; London; New York: CRC Press. cop. 2017, str. 34-35. https://www.crcpress.com/Standard-Operational-Procedures-in-Reproductive-Medicine-Laboratory-and/Rizk-Montag/p/book/9781498719216. [COBISS.SI-ID 6096959]

- HOJNIK Nina, KOVAČIČ Borut Oocyte activation failure: Physiological and clinical aspects. V: SATO (ur.) ***Embryogenesis*.** Rijeka:InTech cop.2019 str 1-25.
- GIANAROLI Luca, FERRARETTI Anna Pia & KOVACIC Borut. Monitoring ART Safety and Biovigilance. V: KISSIN Dimitry M (ur.), ADAMSON David G (ur.), CHAMBERS Georgina (ur.), DE GEYTER Christian (ur.). ***Assisted Reproductive Technology Surveillance***. ISBN 978-1-108-49858-6 . Cambridge. Cambridge University Press. 2019, str. 56-68.
- HREINSSON Julius, KOVAČIČ Borut. Regulation, Licensing, and Accreditation of the ART Laboratory in Europe. V: NAGY Zsolt Peter (ur.), VARGHESE Alex C. (ur.), AGARWAL Ashok (ur.). ***Practical Manual of In Vitro Fertilization: Advanced Methods and Novel Devices*** Zurich : Springer Nature. 2019, str: 1-11.

Cilji in kompetence:

Razvoj osnovnih kompetenc

Kandidat bo kompetenten za delo v klinični praksi, ki zahteva poznavanje laboratorijskih tehnik oploditve z biomedicinsko pomočjo. Poznavanje kriobiologije semena, jajčne celice in zarodka.

Poznavanje fiziologije jajčne celice in semena, tkivnih in celičnih kultur, IVF in ICSI tehnik, identifikacija semena iz tkivnih kultur, injiciranja semena v jajčno celico, asistirane levitve zarodkov, zamrzovanja in vitrifikacije zgodnjih zarodkov in blastocist. Poznavanje in izvajanje evropskega sistema za varnost.

Objectives and competences:

Development of general competences:

The fellow will be competent for clinical practice in conditions for which laboratory techniques of medically assisted reproduction (MAR) are appropriate. Cryobiology of sperm, oocyte and embryo.

The fellow will be able to discuss and understand: oocyte and sperm physiology, tissue and cell culture, IVF and ICSI techniques, sperm identification from tissue specimen, injection of sperm into oocyte, hatching of embryo, slow freezing and vitrification of early embryos and blastocysts. Implementation of EU system for laboratory quality and safety.

Predvideni študijski rezultati:

Znanje in razumevanje:

Poznavanje gametogeneze in fertilizacije, in vitro fertilizacije in drugih postopkov oploditve z biomedicinsko pomočjo.

Z laboratorijskim delom podkrepljeno poznavanje postopkov oploditve z biomedicinsko pomočjo.

Prenesljive/ključne spretnosti in drugi atributi:

Razumevanje tveganj in omejitev v postopku, diagnozi in ocena diagnostičnih postopkov, kontrola veljavnosti diagnostičnih testov in njihove spremenljivosti ter zanesljivosti kriterijev. Razumevanje nacionalnih in evropskih predpisov, ki se nanašajo na varnost in kvaliteto dela v laboratoriju. Razumevanje pomembnosti zbiranja in hranjenja podatkov, vključno z uporabo različnih programov.

Intended learning outcomes:

Knowledge and understanding:

Comprehensive knowledge of gametogenesis and fertilization, in vitro fertilization and other medically assisted reproduction techniques. Laboratory based training in medically assisted reproduction techniques.

Transferable/Key Skills and other attributes:

Understand the risk and limitations of procedures, diagnosis and evaluation of diagnostic procedures, validity of diagnostic tests, variability and reliability criteria.

National and European regulations related to laboratory safety and quality.

Understand the need for clinical record keeping and data storage including the use computers programme for »paper less office«.

Metode poučevanja in učenja:

Predavanja
Priprava seminarja v sodelovanju z mentorjem
Praktično delo (vaje)

Learning and teaching methods:

Lectures
Seminars under mentors supervision and collaboration
Practical work

Načini ocenjevanja:		**Delež (v %) / Weight (in %)**	**Assessment:**	
Naloge (vaje)	20%	20%	Course work	20%
Ustni izpit	20%	20%	Oral examination	20%
Pisni izpit	60%	60%	MCQ test	60%