Univerza v Mariboru

Medicinska fakulteta

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	-	2	3 ali 4
Biomedical Technology	-	2	3rd or 4th

Vrsta predmeta / Course type	**izbirni**
Univerzitetna koda predmeta / University course code:	-

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15	10	10	15	/	100	5

Nosilec predmeta / Lecturer:	Doc. 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:	**Prerequisits:**
Kandidat mora doseči 300ECTS 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:

- David K. Gardner, A. Weissman, CM Howels,Z. Shoham (Editors) Textbook of Assisted Reproductive Techniques: Laboratory and Clinical Perspectives, 4th edition., Informa Healthcare UK Ltd, 2012
- Kay Edler and Brian Dale: In-Vitro Fertilization. Cambridge University Press 2010
- Review articles from scientific journals
- Bruce Alberts, Alexsander Johnson, Peter Walter Julian Lewis (Editors). Molecular biology of the cell, 2008
- William Klug, Michael Cummings, Charlotte Spencer, Michael Palladino(Editors). Essentials of Genetics,7th Edition, 2010
- Peter R. Brinsden (Editor) : A Textbook of In Vitro Fertilization and Assisted Reproduction: The Bourn Hall Guide to Clinical and Laboratory Practice: Includes Bourn Hall Protocols on CD-ROM, Third Edition , Taylor and Francis
- Jonatan Van Blerkom and Linda Gregory (Editors). Esential IVF. Besic research and clinical aplication. Kluwer Academic Publishers, Boston /Dordrecht/ London 2004.

Cilji in kompetence:	**Objectives and competences:**
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.	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:	**Intended learning outcomes:**
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. 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.	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. 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:	**Learning and teaching methods:**
Predavanja Priprava seminarja v sodelovanju z mentorjem Praktično delo (vaje)	Lectures Seminars under mentors supervision and collaboration Practical work

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Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
Naloge (vaje) 20%	20%	Course work 20%
Ustni izpit 20%	20%	Oral examination 20%
Pisni izpit 60%	60%	MCQ test 60%

Reference nosilca / Lecturer's references:

Lecturer's clinical practice and references focuses from 1983 on infertility, assisted reproductive technology and research. His bibliography comprises over 484 articles in professional journals and books.

Nosilec ima opravlja klinično laboratorijsko prakso in ima reference od leta 1990 na področju neplodnosti, tehnik asistirane reprodukcije in raziskav. Njegova bibliografija zajema preko 150 bibliografskih enot, člankov in poglavij v knjigah

Lecturer's clinical laboratory practice and references focuses from 1989 on infertility, assisted reproductive technology and research. His bibliography comprises over 150 articles in professional journals and books.

KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko, RELJIČ, Milan, GAVRIĆ-LOVREC, Vida. Clinical outcome of day 2 versus day 5 transfer in cycles with one or two developed embryos. *Fertil. steril.*. [Print ed.], Mar 2002, vol. 77, št. 3, str. 529-536. [COBISS.SI-ID 1115199

KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Influence of atmospheric versus reduced oxygen concentration on development of human blastocysts in vitro : a prospective study on sibling oocytes. *Reprod. biomed. online (Print)*, 2008, vol. 17, no. 2, str. 229-236. [COBISS.SI-ID 3018303]

KOVAČIČ, Borut, ČIŽEK-SAJKO, Mojca, VLAISAVLJEVIĆ, Veljko. A prospective, randomized trial on the effect of atmospheric versus reduced oxygen concentration on the outcome of intracytoplasmic sperm injection cycles. *Fertil. steril.*. [Print ed.], Jul. 2010, vol. 94, no. 2, str. 511-519, doi: 10.1016/j.fertnstert.2009.03.077. [COBISS.SI-ID 3653439]

KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko, RELJIČ, Milan, ČIŽEK-SAJKO, Mojca. Developmental capacity of different morphological types of day 5 human morulae and blastocysts. *Reprod. biomed. online (Online)*, 2004, vol. 8, no. 6, str. 687-694. [COBISS.SI-ID 1567551]

KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Configuration of maternal and paternal chromatin and pertaining microtubules in human oocytes failing to fertilize after intracytoplasmic sperm injection. *Mol. reprod. dev.*, 2000, letn. 55, št. 2, str. 197-204. [COBISS.SI-ID 688191]

VLAISAVLJEVIĆ, Veljko, KRIŽANČIĆ BOMBEK, Lidija, KOKALJ-VOKAČ, Nadja, KOVAČIČ, Borut, ČIŽEK-SAJKO, Mojca. How safe is germinal vesicle stage oocyte rescue? Aneuploidy analysis of in vitro matured oocytes. *Eur J Obstet Gynecol Reprod Biol*. [Print ed.], 2007, vol. 134, no. 2, str. 213-219. [COBISS.SI-ID 2739263]

VLAISAVLJEVIĆ, Veljko, KRIŽANČIĆ BOMBEK, Lidija, KOKALJ-VOKAČ, Nadja, KOVAČIČ, Borut, ČIŽEK-SAJKO, Mojca. How safe is germinal vesicle stage oocyte rescue? Aneuploidy analysis of in vitro matured oocytes. *Eur J Obstet Gynecol Reprod Biol*. [Print ed.], 2007, vol. 134, no. 2, str. 213-219. [COBISS.SI-ID 2739263]

VLAISAVLJEVIĆ, Veljko, KOVAČIČ, Borut, RELJIČ, Milan, GAVRIĆ-LOVREC, Vida, ČIŽEK-SAJKO, Mojca. Results of intracytoplasmic sperm injection of single oocyte in 362 unstimulated cycles. *J. assist. reprod. genet.*, 2002, vol. 19, no. 3, str. 127-131. [COBISS.SI-ID 995391]

VLAISAVLJEVIĆ, Veljko, KOVAČIČ, Borut, RELJIČ, Milan, GAVRIĆ-LOVREC, Vida. Three protocols for monitoring follicle development in 587 unstimulated cycles of in vitro fertilization and intracytoplasmic sperm injection : a comparison. *Journal of reproductive medicine*, Oct. 2001, vol. 46, no. 10, str. 892-898. [COBISS.SI-ID 805951]

VLAISAVLJEVIĆ, Veljko, KOVAČIČ, Borut, GAVRIĆ-LOVREC, Vida, RELJIČ, Milan. Simplification of the clinical phase of IVF and ICSI treatment in programmed cycles. *Int. j. gynaecol. obstet.*. [Print ed.], 2000, letn. 69, št. 2, str. 135-142. [COBISS.SI-ID 687679]

IVEC, Martin, KOVAČIČ, Borut, VLAISAVLJEVIĆ, Veljko. Prediction of human blastocyst development from morulas with delayed and/or incomplete compaction. *Fertil. steril.*. [Print ed.], Dec. 2011, vol. 96, no. 6, str. 1473-1478.e2. http://www.sciencedirect.com/science/article/pii/S0015028211025143, doi: 10.1016/j.fertnstert.2011.09.015. [COBISS.SI-ID 4067391]