UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Kvantitativne analize nukleinskih kislin
Course title:	Quantitation of Nucleic Acids

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Nanoznanosti in nanotehnologije, 3. stopnja	Bioznanosti	1	1
Nanosciences and Nanotechnoloies, 3rd cycle	Biosciences	1	1

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code: NANO3-808

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15		15		15	105	5

**Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transfered to individual work.*

Nosilec predmeta / Lecturer: Prof. dr. Kristina Gruden

Jeziki / Languages:	**Predavanja / Lectures:**	Angleščina/english
	Vaje / Tutorial:	Angleščina/english

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Zaključen študij druge stopnje.	Completed second level studies

Vsebina:	**Content (Syllabus outline):**
• Teoretične osnove metod za kvantifikacijo nukleinskih kislin • PCR v realnem času: načini analize, referenčni materiali, natančnosti, merilna negotovost • Visoko zmogljivi pristopi, multipleksiranje • Linearne in izotermne metode amplifikacije • Digitalni PCR • Aplikacije metode: diagnostika, transkriptomika • Delo na primerih	• theoretical basis of different quantitative methods • real-time PCR: absolute/relative quantification, reference materials, precision, measurement uncertainty • high throughput approaches, multiplexing • linear and isothermal amplifications • Digital PCR • different applications: diagnostics, on-site detection, gene expression • case studies

Temeljni literatura in viri / Readings:

Pregledni članki, izbor v tekočem letu/review articles, chosen each year specifically

Cilji in kompetence:	**Objectives and competences:**
Predmet je namenjen pripravi študenta na raziskovalno delo na področju kvantitativnih analiz nukleinskih kislin	The course is intended to prepare students for research work in the field of quantitative analysis of nucleic acids.

Študent po uspešno opravljenem predmetu pridobi kompetence: • poznavanje s teoretičnim ozadjem kvantifikacije nukleinskih kislin • poznavanje orodij za kvantifikacijo • samostojno reševanje bioloških problemov povezanih s kvantifikacijo nukleinskih kislin	After successful completion of the course, the student acquires competences: • student comprehends theory behind quantification of nucleic acids • gets acquainted with various relevant tools • is autonomous in solving quantification of nucleic acids related case studies

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • molekularnih osnov kvantitativnega PCR • priprava dobrega eksperimentalnega dizajna • analiza podatkov kvantitativnega PCR • poznavanje kritičnih parametrov kvantifikacije Prenesljive/ključne spretnosti in drugi atributi: • usposobljenost za reševanje problemov povezanih s kvantifikacijo nukleinskih kislin • uporaba domače in tuje literature, • vključevanja pridobljenega znanja v svoj doktorski študij.	Knowledge and understanding of: • molecular biology basis of quantitative PCR • overview of the current stage of technology • essentials of experimental design • qPCR data analysis • critical parameters in quantification Transferable / Key Skills and other attributes: • ability to solve problems related to quantification of nucleic acids • use of national and international literature • incorporation of obtained knowledge in the doctoral thesis

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje bodo potekale izmenično – najprej se bodo podale teoretične osnove, sledil bo primer konkretne uporabe znanja in vaja, ki jo bodo študenti izvedli sami. Vsak študent si za izpit izbere svojo temo, teoretično predvidi zasnovo poskusa in potek analiz ter vse skupaj predstavi še ostalim študentom.	Lectures and practical courses will be given in an interchangeable manner – first a theory on certain topic will be given, followed by practical examples that will be carried out by the students. For the individual work each student will design an experiment and anticipate the analysis workflow for his chosen use case. Students will present their use cases to each other in a form of a short seminar.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Projekt: delo na primeru	100 %	Project: case study

Reference nosilca / Lecturer's references:

- BAEBLER, Špela, SVALINA, Miha, PETEK, Marko, STARE, Katja, ROTTER, Ana, POMPE NOVAK, Maruša, GRUDEN, Kristina. quantGenius : implementation of a decision support system for qPCR-based gene quantification. BMC bioinformatics, ISSN 1471-2105, 2017, vol. 18, str. 1-11.
- MORISSET, Dany, ŠTEBIH, Dejan, MILAVEC, Mojca, GRUDEN, Kristina, ŽEL, Jana. Quantitative analysis of food and feed samples with droplet digital PCR. PloS one, ISSN 1932-6203, 2013, vol. 8, issue 5, str. e62583-1-e62583-9
- DREO, Tanja, PIRC, Manca, RAMŠAK, Živa, PAVŠIČ, Jernej, MILAVEC, Mojca, ŽEL, Jana, GRUDEN, Kristina. Optimising droplet digital PCR analysis approaches for detection and quantification of bacteria : a case study of fire blight and potato brown rot. Analytical and bioanalytical chemistry, ISSN 1618-2642, 2014, vol. 406, issue 26, str. 6513-6528
- DOBNIK, David, GRUDEN, Kristina, ŽEL, Jana, BERTHEAU, Yves, HOLST-JENSEN, Arne, BOHANEC, Marko. Decision support for the comparative evaluation and selection of analytical methods : detection of

genetically modified organisms as an example. Food analytical methods, ISSN 1936-9751, 2018, 18 str., [in press], doi: 10.1007/s12161-018-1194-1.

- CHERSICOLA, Marko, KLADNIK, Aleš, TUŠEK-ŽNIDARIČ, Magda, MRAK, Tanja, GRUDEN, Kristina, DERMASTIA, Marina. 1-aminocyclopropane-1-carboxylate oxidase induction in tomato flower pedicel phloem and abscission related processes are differentially sensitive to ethylene. Frontiers in plant science, ISSN 1664-462X, 2017, vol. 8, str. 1-14, doi: 10.3389/fpls.2017.00464.