Sveučilište u Rijeci
University of Rijeka

BIOtech
Odjel za biotehnologiju
51000 Rijeka, Radmile Matejčić 2
Tel. +385 51 584 550
Fax. +385 51 584 599
e-mail: ured@biotech.uniri.hr

Syllabus for the obligatory course:

Research Project & Thesis Writing

Academic year: 2021/2022

Program: Graduate program Biotechnology for the Life Sciences

Course code: BLS201

ECTS points: 48

Language of the course: English

Teaching hours: 1080 hours (all practical work)

Prerequisite for enrolment: Successful completion of the course BLS103 *Introduction to Laboratory Work & Safety* and any two Laboratory Apprenticeship courses

Course leader and contact information:

Title and name: Doc.dr.sc. Nicholas J. Bradshaw
Address: Department of Biotechnology, O-226, Radmile Matejčić 2, Rijeka
e-mail: nicholas.b@biotech.uniri.hr

Note: Course leader for this course is a managerial role with no automatic teaching hours assigned to it, actual teaching will be conducted by mentors and members of their research groups. This year, these are izv.prof.dr.sc. Antonija Jurak Begonja, izv.prof.dr.sc. Igor Jurak and izv.prof.dr.sc. Nela Malatesti and their research groups, while izv.prof.dr.sc. Ivana Munitić is co-mentor to a student working in another institution.

Time period: 1st October 2021 – 18th June 2022

Teachers: See "Course leader" section above

Literature: Will be supplied be individual mentors

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Course objectives:

Students will engage in an independent and novel research project within the research group of their mentor. In this manner, they will gain substantial real life experience at working in a research environment. Students will therefore learn and develop skills in a range of scientific techniques, as well as having the opportunity to develop their soft skills of experimental design, analysis, scientific writing and presentation, and working within a research team.

The work produced by a student is expected to be substantial enough, and of sufficient quality, to lead to them being author or co-author on at least one peer reviewed research paper in a scientific journal. This could potentially be published during the research project, but will more likely be written and published after graduation, in collaboration with their mentor.

Through involvement in an in-depth research project, students should be ideally situated to compete for places on international doctoral training courses, and have an excellent start in developing a future career in research (either academic or industrial).

Learning outcomes:

After completion of the course, students will:

1) Have gained substantial experience at working in a research environment
2) Have substantial competencies and experience at multiple experimental techniques
3) Have gained confidence in sharing their work, through written and spoken forms of communication
4) Have personally generated a significant amount of research data, representing novel and publishable findings
5) Be in an excellent position to apply for international doctoral programs, and to initiate a career in research

Detailed course content:

At the end of their first year, as part of the course *Research Proposal & Poster Presentation*, each student will have selected a mentor for their research project. This will normally be one of the two professors who supervised them for their Laboratory Apprenticeship courses. The student and mentor may also optionally agree on a co-mentor, particularly if the proposed research project is of an interdisciplinary nature. If a co-mentor is appointed, then either the mentor of the co-mentor may be from an academic of research institution other than the Department of Biotechnology. Under no circumstances can an external mentor be appointed without a co-mentor from the Department of Biotechnology.

For the entire duration of the second year, each student will conduct an independent research project, under the supervision of their mentor. This will fit within the mentor's general area of research interest and project(s),

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and should represent novel research. It is anticipated that at early stages of the project, the student will require a considerable amount of direct mentorship, but that over time they will become increasingly independent in their work as their skills develop. They will, nevertheless, meet with their mentor (and if appropriate, co-mentor) regularly in order to discuss their progress, data and future directions.

Students will also be expected to present and discuss their work in formal or informal environments. At the mentor's discretion, this could include lab meetings and/or presentation at (normally local) scientific congresses. Students may also be asked to help write up their work for publication in a scientific journal (either during or after the thesis).

Through this project, students will hone their experimental skills learned in their Laboratory Apprenticeship, and likely learn new ones. They will also implement their various soft skills learned in previous taught modules, including experimental design, experimental analysis (potentially statistical), scientific writing, scientific presentation, mathematical and IT skills and teamwork. All of these will be performed in a real research environment, providing context for the student, and giving them a genuine experience of life in a research profession.

Towards the end of their project, students will present their findings as part of the *Research Symposium* course. Taking into account any feedback received at this event, students will then prepare and submit a graduate thesis based on their research project, which will subsequently be defended in front of a thesis defence committee.

Requirements, methods of assessment and evaluation:

Students will work full time in the research groups of their mentor, conducting a novel research project, based on their previous Research Proposal. This project may be stand alone, or represent a distinct part within the wider research of the group. Students will keep a lab journal of their work, written in English, and meet with the mentor regularly to discuss their work.

Students should submit an "Application for topic of master's thesis" form by the end of November.

The student will also be expected, within reason, to engage in the day-to-day activities of the group, including taking part in group meetings, maintaining the condition of the lab and equipment, and presenting their work in informal environments. Mentors may also encourage students to present their work at one or more congresses during their projects. It is hoped that all student projects will eventually be published as either part or the entirety of a peer reviewed journal article. Therefore, students must record and store their data in a manner that is clearly and easily accessible to the mentor. Student may also be invited to participate in the writing process of any articles.

Students will adhere to the standard ethical codes and standards of scientific research, including regarding data integrity and the avoidance of plagiarism. If a student's work will require the use of human or animal samples

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or personal data, of any description, then the students will be expected to adhere to ethical guidelines laid down for the project by local or national ethics committees.

At the end of the project, students will write and submit a graduate thesis in English, based on their research project. The format of this will be as follows:

Front matter
(no page numbers):

- Cover, using the format shown at the end of this document, in English
- Page repeating the contents of the cover plus mentor's name, in English (format at end of document)
- Page, repeating the contents of the cover plus mentor's name, in Croatian (format at end of document)
- Page showing name of mentor, date of defence and committee (format at end of document)
- Abstract (up to 300 words) and 3-5 keywords in English
- Abstract ("*Sažetak*", up to 300 words) and 3-5 keywords ("*Klujčne rijeći*") in Croatian
- Optional: An acknowledgements page
- Table of contents, listing all chapters and subchapters and their start pages
- Optional: Lists of tables, figures and abbreviations

Main body of text
(with page numbers – chapters should be numbered as shown below, and subchapters should also be numbered, e.g. sub-chapters of the result section would be 4.1, 4.2., etc)

- 1. Introduction
  Approx. 3500 words, a literature review which explains the current understanding of the field, and puts the objectives of the research project and thesis into scientific context
- 2. Objectives of the work
  Approx. 300 words, which explains the general purpose of their work, if not included in the introduction, and that includes one or more specific hypotheses to be tested)
- 3. Materials and methods
  Approx. 2000 words, which explains the procedures and methods used in sufficient detail to allow work to be replicated. It is not sufficient to simply provide a reference to previous methods, without also detailing it. Provide details only of key reagents, not a list of all chemicals used.
- 4. Results
  Approx. 3500 words, a description of the results obtained – however interpretation of them should wait for the discussion section. Results should be presented in a logical order that makes them easy to follow – this may or may not be chronological. All results must be based on methods given in the materials and methods chapter. It is not necessary to include all results obtained during the course of the research project, particularly if some end up being "off topic" for the final thesis. Ideally, each experiment should begin with a brief description of how they relate to the project goals and hypotheses. Figures and/or tables should be used (as appropriate) to display data obtained, and each of them should have a legend which gives enough information to understand the data (a short description of the experiment, but not stating of results).

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- 5. Discussion
  Approx. 2000 words, a discussion of the results. This should briefly state the major findings, beginning with the main ones, and then any secondary discoveries. The findings of the thesis should be put into the context of the wider scientific literature, and show how they contribute to it. This should include an evaluation of their quality, and how they fit into the existing literature, including discussion of any discrepancies. Potential issues with the work should be explored, and future experiments should be suggested.
- 6. Conclusions
  Approx. 300 words, a concise description of the main findings, how the contribute to the field, their scientific value and any open questions.
- 7. Reference list
  Written in "Vancouver" style. All citations in the main text should be referenced by a number, in the order in which they should appear. The reference list should be given in numerical order, and therefore the order in which the references appear in the thesis. Example of citation:

  4. Silva-Vargas V, Maldonado-Soto AR, Mizrak D, Codega P, Doetsch F. Age-Dependent Niche Signals from the Choroid Plexus Regulate Adult Neural Stem Cells. **Cell Stem Cell** 2016; **19**: 643–652

Back matter
(page numbers not required)

- If appropriate: Acknowledgement of research funding used.
- Student's CV, written in "Europass" format

The thesis should be written in English (either USA or UK spellings, but not a mixture of the two), using Verdana font size 12, with 1.5 line spacing. Croatian title, abstract and key words should be equivalent to their English versions, and may be translated by someone else (e.g. a laboratory colleague), however the student remains responsible for their content.

This thesis will be submitted to a thesis defence committee, comprising of the mentor, co-mentor (if applicable) and two other members of faculty (assistant professor or higher) who have no existing role in the project. This committee may contain staff members from outside of the Department of Biotechnology, subject to the rules stated in *Postupak za prijavu, oblikovanje i obranu završnog i diplomskog rada*. All theses will be checked for plagiarism using Turnitin.

Two weeks later, the student will undergo a Thesis Defence, at which they will present their work to the defence committee and answer oral questions. At the defence, the committee will agree two grades for the students, one for the BLS201 Research Project & Thesis Writing (48 ECTS), and one for BLS204 Thesis Defence (6 ECTS).

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Qualification and grades (according to Pravilnik o studijima Sveučilišta u Rijeci):

Examination deadlines:

Students will be assessed based on the quality of their final master's thesis, which may be submitted from 20th June 2022, and may be submitted **no later than 1st July 2022**. Submission is directly to members of the committee, either electronically or in printed form. Committee members may request changes as required. At this stage, the mentor or co-mentor should submit a *Odluka o imenovanju stručnog povjerenstva i terminu obrane diplomskog rada* as .doc or .docx file to ured@biotech.uniri.hr.

Grading of the thesis will be awarded on the day of their thesis defence, which may be no later than 15th July 2022. After the defence, the student must submit a .pdf version of their final thesis on CD to the Department.

In exceptional circumstances, a thesis committee may agree to extend the submission deadline to no later than 2nd September 2022, and the defence date to no later than 16th September 2022, if requested by both the student and their mentor.

Final grades

The following grades will be awarded based on the final score:

Percentage score	ECTS grade	Numerical grade
90% to 100%	A	Excellent (5)
75% to 89.9%	B	Very good (4)
60% to 74.9%	C	Good (3)
50% to 59.9%	D	Satisfactory (2)
0% to 49.9%	F	Unsatisfactory (1)

The final grade is based on the sum of percentage points accumulated during the course and on the final exam. Passing grades are excellent (5), very good (4), good (3) and satisfactory (2).

Additional information:

Academic integrity

Students are required to respect the principles of academic integrity, and refer to the following documents: Ethical rules of the University of Rijeka and Ethical rules for students.

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Schedule of classes:

Students are required to work the equivalent of 30 hours a week for 36 weeks. The exact timing of this work will be set by their mentors, in consultation with the student. This will primarily consist of laboratory research, but will also involve writing of the student's final thesis, reading and reviewing of appropriate literature as well as meetings with the mentor and their research group.

UNIVERSITY OF RIJEKA

DEPARTMENT OF BIOTECHNOLOGY

Graduate programme

"Biotechnology for the Life Sciences"

(Full name of student)

(Title of thesis, in English)

Master's thesis

Rijeka, (year)

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Rijeka, (year)

Mentor: (mentor's title and full name, also, co-mentor if appropriate)

SVEUČILIŠTE U RIJECI

ODJEL ZA BIOTEHNOLOGIJU

Diplomski sveučilišni studij

„Biotehnološka istraživanja znanosti o životu”

(Full name of student)

(Title of thesis, in Croatian)

Diplomski rad

Rijeka, (year).

Mentor: (mentor’s title and full name, also, co-mentor if appropriate)

Master’s thesis was defended on (date)

In front of the Committee:

1. (Head of committee, title and full name)
2. (Committee member, title and full name)
3. (Mentor, title and full name)
4. (Co-mentor, title and full name, if appropriate)

This thesis has (number) pages, (number) figures, (number) tables and (number) citations.

Abstract

(Body of abstract, approximately 300 words, in English)

Keywords: (3-5 key words, in English)

Sažetak

(Body of abstract, approximately 300 words, in Croatian. Should match content of English version)

Ključne riječi: (3-5 keywords in Croatian, should be direct translation of the English keywords)