Detailed curriculum for the course:

Introduction to the scientific method

Academic year: 2024/2025

Program: Master programs „Drug Research and Design", "Biotechnology in Medicine" "Medical Chemistry" and „The Biotechnology for the Life Sciences "

Code: IRL202

ECTS points: 5

Language of the course: English

Teaching hours: 28L+14S+8V

Pre-requisite for the enrollment: None

Course leader and contact information: Assoc.prof. Rozi Andretić Waldowski (11L + 14S + 2E)

Address: University of Rijeka, FABRI, Radmile Matejčić, tel: 584 553 e-mail: randretic@uniri.hr

Contact hours: Course leader is at the disposal for consultations any time during the working hours, with previous appointment.

Teaching staff: Assist.Prof. Christian Raynolds (4L+3E)

Assoc.Prof. Nicholas Bradshaw (2L + 2X2E)

Prof. Antonija Jurak Begonja (1L + 2X2E)

Assit. Prof. Stribor Marković (4L)

Assit. Prof. Danijela Kalafatović (3L)

TBD (3L)

Required reading:

1. Required reading materials will be supplied during the class
2. Kevin W. Plaxco: The Art of Writing Science, PROTEIN SCIENCE 2010 VOL 19:2261—2266
3. Introduction to Journal-style Scientific Writing, http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWgeneral.html

Suggested reading

1. Vanja Pupovac: "Akademsko pisanje", http://akademsko-pisanje.sz-ri.com
2. Matko Marušić i suradnici: Uvod u Znanstveni rad u medicini, Medicinska Naklada, Zagreb, 2013.
3. Mimi Zeiger: Essentials of Writing Biomedical Research Papers, 2nd edition, McGraw Hill, 2000.

Course description:

This course will give students the basic knowledge required for their future work in research laboratories, which includes: preparing a hypothesis-driven research plan based on scientific evidence and skills in presenting the results of their work, writing a CV, and project proposal.

In the bioethics part of the course, students will learn: to distinguish scientific from non-scientific approaches, types and ethical use of AI platforms in scientific work, about ethical approaches in scientific research, and objectively discuss ethical principles in modern bioscience.

In the science writing part of the course, students will learn to: independently search different literature databases, become proficient in the use of reference management software, acquire skills in scientific writing, be able to write a Master thesis, research paper, project proposal, and science outreach article and be able to present their work in oral or poster form.

Learning outcomes:

1. Form an opinion on the use of appropriate scientific methodology
2. Critically judge the quality of scientific publications
3. Support the importance of bioethics in the implementation of the scientific approach
4. Self-evaluate the quality of scientific writing
5. Support the importance of clear, audience-friendly scientific communication

Detailed course content:

A. Lectures:

TITLE	HOURS AND LECTURER
L1 Scientific method and experimental design	**3 H / RAW**
L2 Introduction to scientific writing	**2 H / CR**
L3 Writing a research paper I	**2 H / CR**
L4 Elements of a research article	**1 H /RAW**
L4 Ethical use of AI in the scientific research and publishing	**3 H /**
L5 Figures and legends	**1 H /RAW**
L7 Result description and interpretation	**1 H /RAW**

L8 Writing motivational letter and a CV	**1 H / AJB**
L9 Editing	**1 H / RAW**
L10 Literature search	**1 H / NB**
L11 Preparing a poster and oral presentation	**1 H / RAW**
L12 Writing a research proposal	**1 H / RAW**
L13 Writing a science outreach article	**1 H / RAW**
L14 Publishing a scientific article	**2 H / NB**
L15 Bioethics in publishing	**1 H / RAW**
L16 Writing a chemistry research paper	**3 H / DK**
L17 Methodology in drug research	**4 H / SM**

B. Seminars:

TITLE	**HOURS AND LECTURER**
S1 Scientific method and experimental design	**1 H / RAW**
S2 Elements of a research article	**1 H / RAW**
S3 Figures and legends	**2 H / RAW**
S4 Results description and interpretation	**1 H / RAW**
S5 Science vs. pseudoscience	**1 H / RAW**
S6 Journal club	**3 H / RAW**
S7 Bioethics in publishing	**1 H / RAW**
S8 Science outreach article	**2 H / RAW**
S9 Project proposal	**2 H / RAW**

Excesizes:

TITLE	**HOURS AND LECTURER**
E1 Introduction to scientific writing	**2H / CR**
E2 Writing a research paper I	**1H / CR**

E3 Writing motivational letter and a CV	**2 x 2 / AJB**
E4 Editing	**2 / RAW**
E5 Literature search	**1 x 2 / NB**

Schedule of classes:

DATE	GROUP	TIME	HRS IN CLASS	CLASS ROOM	CONTENT	LECTURER
01.10.2024.	all	14:30-18:00	3L 1S	030	Scientific method and experimental design	Assoc.Prof R.A.Waldowski
02.10.2024.	all	14:00-18:00	2L 2E	030	Introduction to scientific writing	Assist.Prof.C.Reynolds
03.10.2024.	all	14:00-19:00	1L 1E 1L 1S	030	Writing a research paper Elements of a research article	Assist.Prof. C.Reynolds Assoc.Prof R.A.Waldowski
04.10.2024.	all	14:00-17:00	3L	030	Ethical use of AI in scientific research and publishing	
07.10.2024.	1	13:00-18:00	2L 3S	030	Figures and legends Description and interpretation	Assoc.Prof R.A.Waldowski
08.10.2024.	1 2	11:00-12:00 12:00-13:00 13:00-14:30 14:45-16:15	1L 1L 2E	030 030 339 339	Editing Writing a motivational letter and CV Mot. letter and CV	Assoc.Prof R.A.Waldowski Prof. A. Jurak Begonja Prof. A. Jurak Begonja

09.10.2024.	2	13:00-14:30 14:45-16:15	1L 1x2E	339	Literature search	Assoc.Prof. N. Bradshaw
10.10.2023.	all	10:00-15:00	3L 1S 1E	030	Writing a project Preparing a poster Science outreach Science/Pseudoscience Editing	Assoc.Prof R.A.Waldowski
15.10.2024.	all	16:00-18:00	2S	030	Journal Club	Assoc.Prof R.A.Waldowski
21.10.2024.	all	11:00-15:00	2E 1L 1S	030	Sci. publishing Bioethics in sci. publishing	Assoc.Prof. N. Bradshaw Assoc.Prof R.A.Waldowski
22.10.2024.	all	14:00-17:00	3L	030	Writing a chemistry article	Assoc.prof.D.Kalafatović
23.10.2024.	all	16:00-18:00	2S	030	Writing a science outreach article	Assoc.Prof R.A.Waldowski
24.10.2024.	all	17:00-19:00	2S	030	Writing a project proposal	Assoc.Prof R.A.Waldowski
25.10.2024.	all	12:00-15:00	3L	030	Methodology in drug research	Assoc.Prof S.Marković
28.10.2024.	all	11:00-13:00		030	FINAL EXAM	Assoc.Prof R.A.Waldowski

Required student's engagement and scoring:

Classes are organized as a combination of lectures, exercises and seminars. Knowledge will be continuously assessed through evaluations of seminar work, activity during exercise session and lectures, and homework. Some seminars and exercises will be organized in pairs or small groups to increase group collaboration and ensure the development of practical skills.

Examination deadlines:

The final exam will be on Monday 28th of October 2024.

A second test date will be on Friday 17th of November 2023.

Additional test deadlines (maximum two, between January and June) will be arranged with students if needed.

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

Students will be graded continuously during the class for their participation, activity and quality of their work assignments during the course (max 70% of the grade) and for the grade on the final exam (max 30% of the grade).

Students must attain a minimum of 35% of the grade during the continuous grading to be allowed to take the final exam.

Continuous grading (70%) consists of the following elements:

Homework 1 – Influence of bad science on public opinion (5%)

Homework 2 – Misuse of AI in science (10%)

Homework 3 – Preparing figures with legends and result description and interpretation (15%)

Homework 4 – Short project proposal (10%)

Homework 5 – Short science outreach article (10%)

Activity during class stems from the read materials that will be given as a preparation for the class, followed by short presentations, discussions, and debates will be graded 5% for the following topics: Figures and legends, Journal club, project proposal, and Science outreach.

Final exam (30%)

The final exam will consist of problem-solving / essay questions and several multiple-choice questions.

Final grades:

The final grade is based on the percentage points attained during the continuous grading and on the final exam. The following grades will be awarded based on the sum of achieved scores:

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)

Passing grades are excellent (5), very good (4), good (3) and satisfactory (2).

Additional information:

Academic integrity

During the class and the exam, students are expected to behave according to the highest standards of integrity and ethical behavior some of which will be discussed in this class. In addition, students can refer to the documents: Etički kodeks Sveučilišta u Rijeci and Etički kodeks za studente.

During classes, students are expected to show fairness in interactions, respect for each other's effort, and fair acknowledgment of the contributions of others. In their homework assignments, students should strictly avoid any form of plagiarism, should properly cite sources they used for their work, and have to present data truthfully. Academic dishonesty, such as presenting the work of others as the student's own, use of AI-generated content without proper acknowledgment, and material produced in collaboration with others (unless explicitly permitted), will be punished by no grade for the given assignment and the breach of ethical conduct will be reported to the Ethical Committee of the FABRI.

Questionnaire at the end of the class:

All students are requested to fill out the questionnaire about their satisfaction with the content of the course and the course leader **to improve the future quality of the course**. Valuation is anonymous and is done using ISVU system with the „Studomat" application. The questionnaire is defined at the level of the University.

đ