



Detailed curriculum for the course:  
**Introduction to the scientific method**

<b>Academic year:</b>	2023/2024
<b>Program:</b>	Master programs „Drug Research and Design“, "Biotechnology in Medicine" "Medical Chemistry" and „The Biotechnology for the Life Sciences “
<b>Code:</b>	IRL202
<b>ECTS points:</b>	7
<b>Language of the course:</b>	English
<b>Teaching hours:</b>	30 L + 10 S + 16 E
<b>Pre-requisite for the enrollment:</b>	No specific courses required
<b>Course leader and contact information:</b>	Assoc.prof. Rozi Andretić Waldowski (10L + 8S + 10E) Address: Department of Biotechnology, University of Rijeka, Radmile Matejčić 2 tel: 584 553 e-mail: randretic@uniri.hr
<b>Contact hours:</b>	Course leader is at the disposal for consultations any time during working hours with previous appointment.
<b>Teaching staff:</b>	Assist.Prof. Christian Raynolds (6L + 2S + 2E) Assist.Prof. Stribor Marković (9L) Assoc.Prof. Nicholas Bradshaw (2L + 2X2E) Assoc.Prof. Antonija Jurak Begonja (1L + 2X2E) Prof. Milan Mesić (2L)
<b>Required reading:</b>	



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

### **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 research work in research laboratories, which includes: preparing a hypothesis driven research plan based on scientific evidence in accordance with bioethical standards and skills in presenting 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, explain the characteristics of the scientific method and how it evolved from philosophy of science, understand the importance of ethical approaches in performing 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 a reference management software, formulate a pertinent scientific question based on researched literature, formulate a hypothesis, acquire skills in scientific writing, be able to write a Master thesis, research paper and be able to present their work in oral or poster form to either expert or lay audience.

### **Learning outcomes:**

1. Gain general knowledge about the scientific method and hypothesis-driven research
2. Gain general knowledge about types of scientific investigation and example of scientific method applied during drug research development
3. Gain general knowledge about the characteristics and types of scientific literature
4. Gain practical skills related to using different search databases for literature searches and references management
5. Gain general knowledge about the elements and practical skills involved in formatting a Master Thesis
6. Gain general experience about scientific writing
7. Gain specific experience in poster and oral communication



8. Gain general knowledge of bioethics as it applies to research work and publication
9. Gain specific experience about writing a project proposal
10. Gain general knowledge about communicating science to experts and lay audiences

#### Detailed course content:

##### A. Lectures:

TITLE	HOURS AND LECTURER
L1 Science vs pseudoscience	(1 H) RAW
L2 Introduction to scientific writing	(2H) CR
L3 Writing a research paper I	(2H) CR
L4 What is science	(1 H) SM
L5 History and philosophy of science	(1 H) SM
L7 Writing a research paper II	(2H) CR
L8 Scientific publishing process	(2 H) NB
L9 Preparing figures and legends	(2 H) RAW
L10 Critical reading – Journal club	(2 H) RAW
L11 Preparing a poster and oral presentation	(1 H) RAW
L12 Writing motivational letter and a CV	(1 H) AJB
L13 Research methodology in drug research and development	(7 H) SM
L14 Bioethics in research	(1 H) RAW
L15 Bioethics in publishing and communicating science	(1 H) RAW
L16 Writing a chemistry research paper	(2 H) TBD
L17 How to prepare a project proposal	(2 H) PK
L18 Science outreach	(2 H) RAW

##### B. Seminars:

TITLE	HOURS AND LECTURER
S1. Critical thinking vs pseudoscience	(1 H) RAW
S2. Writing a research paper	(2H) CR
S3. Bioetics	(2 H) RAW
S4. Science outreach	(2 H) RAW
S5. Poster presentations	(3 H) RAW



*Exercises:*

TITLE	HOURS AND LECTURER
E1 Writing a research paper	(2 ) CR
E2 Literature search	(2x2) NB
E3 Mendeley reference manager	(1) RAW
E4. Figures and legends	(2 ) RAW
E5 Journal Club – critical reading	(2 ) RAW
E6 Results: description vs interpretation	(3 ) RAW
E7 Title abstract and aim	(1 ) RAW
E8 Editing	(1 ) RAW
E9 Writing motivational letter and a CV	(2 X 2) AJB

**Schedule of classes:**

DATE	GROUP	TIME	HRS IN CLASS	CLASS ROOM	CONTENT	LECTURER
03.10.2023	all	11:00-13:30	1L	269	Introduction Assignments L1 Sci vs Pseudosci.	Assoc.prof R.A.Waldowski
03.10.2023	all	13:00-17:00	2L 2L	online	L2 Intro to sci. writing L3 Writing a res paper	Assist.Prof. C.Reynolds
04.10.2023	all	08:30-12:00	1L 1L	269	L4 Science L5 History & Philosophy	Assist.Prof. S. Marković
05.10.2023	all	08:30-12:30	2L 2E	online	L7 Writing a res paper E1 Writing a res paper	Assist.Prof. C.Reynolds
09.10.2023	1 All 2	11:30-13:00 13:00-14:00 15:15:16:45	2E 1L 2E	339 269 339	E2 Lit search L8 Sci publishing E2 Lit search	Assoc.Prof. N. Bradshaw
10.10.2023	all	12:00-16:00	1S 1E 2L	268	S1 Pseudosci E3 Mendeley L9 Fig nad leg	Assoc.prof R.A.Waldowski



11.10.2023	all	10:00-12:00 14:00-16:00	2L 2S	269 On-line	L10 Journal club S2 Writing res paper	Assoc.prof R.A.Waldowski Assist.Prof. C. Reynolds
12.10.2023	all	09:00:13:00	2E 2E	269	E4 Figures and legends E5 Journal club	Assoc.prof R.A.Waldowski
16.10.2023	all	09:00-12:00	2E 1L	269	E6 Results L11 Poster and oral pres	Assoc.prof R.A.Waldowski
17.10.2023	all	09:00-12:00	1E 1E 1E	269	E6 Results E7 Title abs aim E8 Editing	Assoc.prof R.A.Waldowski
18.10.2023	all	09:00-10:00 10:00-11:30 11:45-13:15	1L 2E 2E	269 339 339	L12 Writing mot lett nd CV E9 Writing mot lett nd CV E9 Writing mot lett nd CV	Assoc.prof A. Jurak Begonja
19.10.2023	all	08:30-12:30	4L	269	L13 Research methodology in drug research and development	Assist.Prof. S. Marković
23.10.2023	all	08:30-11:30	3L	269	L13 Research methodology in drug research and development	Assist.Prof.S. Marković
24.10.2023	all	12:00-16:00	1L+1S 1L+1S	268	L14+S3 Bioetics in res L15+S3 Bioetics in publishing	Assoc.prof R.A.Waldowski
25.10.2023	all	12:00-14:00 14:00:16:00	2L 2L	268	L17 Writing project proposal L16 Writing chem paper	Assoc.prof R.A.Waldowski Prof. M.Mesić
26.10.2023	all	08:15-11:00	1L+2S	269	L18+S4 Science outreach	Assoc.prof R.A.Waldowski
27.10.2023	all	09:00-12:00	3S	268	S5 Posters	Assoc.prof R.A.Waldowski
30.10.2023	all	11:00-12:30	2	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 small groups to increase group collaboration and ensure the development of practical skills.

### **Examination deadlines:**

The final exam will be on Tuesday 31th of October 2023.

A second test date will be on Friday 17th of November 2022.

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):**

Assessment during the course (70%)

Students are going to obtain scores during the course, in the following areas:

**Seminars (30%)** – Students will be assessed based on their contributions to the S1 debates: 10 %. For S3 poster: content of their presentations (6 %), content and appearance of the poster (9 %) and their involvement in both asking and answering questions during the discussion phase (5%).

**Continuous grading (40%)** – Students will be assessed based on the quality of their homework. There will be 4 homework. Some assignments will be done in pairs and others individual. Homework will include: generations of Figures and legends, Scientific writing, Description and interpretation of results and Project proposal. 5% will be assigned for overall participation and activity during the entirety of the course.

#### **Final exam (30%)**

The final exam will consist of problem solving/ essay questions and multiple choice questions. Eligibility to take the final exam will be based on scores achieved during the course (out of a maximum of 70%).

Students scoring between 0 and 34.9% will not be allowed to attend the final exam.

Students scoring above 35% will be allowed to take the final exam.

#### **Final grades:**

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)



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University of Rijeka



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 documents: Etički kodeks Sveučilišta u Rijeci and Etički kodeks za studente.

Questionnaire:

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