Detailed curriculum for the course:

Introduction to Laboratory Work & Safety

Academic year: 2025/2026

Program: Biotechnology for the Life Sciences (1st year)

Course code: BLS103

ECTS points: 3

Language of the course: English

Teaching hours: 30 hours (8 lectures, 8 seminars, 16 practical work)

Pre-requisites for enrolment: No specific courses required.

Course leader and contact information:

Title and name: Izv. prof. dr. sc. Nicholas J. Bradshaw
Address: Faculty of Biotechnology & Drug Development, O-226
E-mail: nicholas.b@biotech.uniri.hr

Time period: 9th October 2025 – 28th November 2025

Teaching staff:

Izv. prof. dr. sc. Nicholas J. Bradshaw
(6 hours lectures, 2 hours seminars)
Izv. prof. dr. sc. Nela Malatesti
(2 hours lectures)
Maja Juković
(1 hour seminars, 8 hours practical work)
Matea Kršanac
(8 hours practical work)
Martina Mušković Lukić
(5 hours seminars)

Required literature:

University health and safety documents (supplied over Merlin):

Health and safety at work: General program
Sigurnost i zaštita na radu – opći program
Instructions for working safely with a computer
Upute za rad na siguran način s računalom
Instructions for working safely with chemical hazards
Upute za siguran rad s kemijskim opasnostima
Instructions for working safely in a laboratory with equipment and apparatus
Upute za rad na siguran način na laboratorijskim strojevima i uređajima

(Titles in italics indicate the original title of the document approved by the University Senate, documents supplied are translations into English of these)

Optional literature:

Will be supplied over Merlin:

Laboratory biosafety manual (3rd edition), World Health Organisation, 2004

Course description:

Students will receive an intensive short course aimed at preparing them for work in the laboratory, prior to their Laboratory Apprenticeship courses, and second year Research Project.

Students will receive instructions in occupational safety in a laboratory environment, including biological, chemical and general hazards. They will sit a safety at work exam, completion of which will certify them to work in the laboratory.

Additionally, students will receive basic training and practise in standard laboratory techniques and mathematical calculations, to ensure that all students possess the core competencies required for their later research work.

Finally, students will receive a brief introduction to research being conducted in the Department of Biotechnology, which will facilitate their selection of their first Laboratory Apprenticeship.

Learning outcomes:

By the end of the course, students will:

1) Be familiar with the various occupational safety concerns of working in a laboratory, including both biological and chemical hazards.
2) Have completed a test on safety in the laboratory, certifying them to begin practical work.
3) Be aware of the standard practises and etiquette of working in a research group, including the maintaining of laboratory journals.
4) Have refreshed their knowledge, and gained experience, at the basic mathematical calculations and IT skills required for work in a research environment
5) Have gained experience at basic laboratory techniques such as pipetting, buffer preparation and handling of both bacteria and mammalian cells.
6) Be aware of the research topics currently being studied at the Department of Biotechnology, allowing them to select an appropriate mentor for their first Laboratory Apprenticeship

Detailed course content:

Safety in the Laboratory (6 hours lectures)
Students will receive 3x 2 hour lectures covering occupational health and safety in the laboratory. Of these: The first will these will cover general safety concerns, including electrical and physical hazards, and basic emergency response. The second will cover biological aspects of safety, including dealing with living microorganisms and cells. The third will cover chemical hazards and safety.

Working in a research group (1 hour seminar)
In these seminars, basic considerations of working in a laboratory will be discussed, including lab etiquette, the process of keeping a laboratory journal and the importance of recording and storing data in a clear and accessible manner.

Basic laboratory calculations (4 hours seminars)
Students will receive a basic revision course on some of the calculations that are required when working in a laboratory, and in particular those concerning determining concentrations of components in buffer solutions. These will be reinforced by a series of exercises.

Introduction to laboratory techniques (4 hours seminars)
Students will be given a general introduction to the techniques commonly used in biological and biochemical research, immediately before using them in laboratory exercises.

Laboratory practical exercises (12 hours practical work)
Students will undertake a range of laboratory exercises, either alone or in pairs, designed to familiarise themselves with basic techniques, skills and equipment of a laboratory. Many students will have covered all of this during their undergraduate studies; however this will provide an opportunity for revision, as well as to fill in any gaps in individual's knowledge. Early sessions will focus on pipetting, measuring and buffer preparation. Later sessions will allow students to practise aseptic methods of working, through exercises involving bacteria and mammalian cell cultures. Students will keep a laboratory journal of their work in these sessions.

Research Topics in the Department (2 hours lectures)
Over two sessions, students will listen to short (15-20 minute) presentations from representatives of the different active research groups within the Department of Biotechnology, who will provide introductions to their current research projects and interests. On the basis of these presentations, students will be asked to list the group(s) that they are interested in performing their Laboratory Apprenticeships in. This will in turn be used to assign students to mentors.

Lectures
L1: Occupational health and safety (2 hours)
L2: Chemical health and safety (2 hours)
L3: Biological health, safety and ethics (2 hours)
L4: Research topics in the department (2 hours)

Seminars
S1: Calculations required for laboratory work 1 (2 hours)
S2: Calculations required for laboratory work 2 (2 hours)
S3: Working with mammalian and bacterial cell cultures (1 hour)

S4: Calculations required for laboratory work 3 (1 hour)
S5: DNA cloning and PCR (2 hours)

Practical exercises
P1: Basic laboratory technique (1 hour)
P2: Buffer preparation (2 hours)
P3: Transforming bacteria (2 hours)
P4: Mammalian cell culture (2 hours)
P5: SDS-PAGE (4 hours)
P6: PCR (1.5 hours)
P7: Agarose gels (2.5 hours)

Requirements, methods of assessment and evaluation:

Examination deadlines:

The final exam will be Friday 28th November 2025, 14:00, room O-269.

For those who need to retake the test, the second test sitting will be on the 15th December, 9:00, room O-269.

Additional test sittings (maximum two more) will be by arrangement between the students and teacher.

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

Assessment during the course (70%)
Students will obtain score during the course, in the following areas:

Health and safety test (20%) – Students will undergo a multiple choice test based on the content of lectures 1-3.

Students must achieve at least 15/20 (75% of available marks) in order to proceed to the final exam. Students who do not achieve this on the first attempt will be offered the opportunity to sit the test again.

Seminar work (20%:) – Students will be graded based on work done in class and/or as homework from seminars 2, 4, 6 7

Practical work (30%) – Students will be assessed based on the abilities and results demonstrated in the practical exercises, as well as their lab book.

Final exam (30%)
Eligibility to sit the final exam will be based on scores achieved during the course (out of a maximum of 50%). This will cover material from all of the seminars, and the techniques used in the practicals.

- Students scoring between 0 and 34.9% will not be allowed to sit the final exam
- Students scoring between 35% and 70% will be allowed to sit the final exam

Additionally, students must have achieved at least 15/20 on the health and safety test.

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).

To complete the course students must attain a passing mark for the entire course (50% or higher) as well as achieving at least 15% of the 30% available on the final exam.

Additional information:
Academic integrity

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

Date	Time	Room	Activity	Teacher
9.10.2025	10:00-11:30	O-269	L1 - General safety	Nicholas Bradshaw
16.10.2025	13:00-14:30	O-269	L2 - Chemical safety	Nela Malatesti
23.10.2025	10:00-11:30	O-269	L3 - Biological safety	Nicholas Bradshaw
30.10.2025	12:00-14:00	O-268	S1 - Lab calculations 1	Martina Mušković Lukić
06.11.2025	12:00-14:00	O-269	S1 - Lab calculations 2	Martina Mušković Lukić
	14:30-15:30	O-353	Health & Safety Test	
	TBC*		L4 - Research topics	Nicholas Bradshaw
10.11.2025	9:00-11:00	O-353	P1 - Basic lab technique	Maja Juković
14.11.2025	9:00-11:00	O-353	P2 - Buffer preparation	Maja Juković
17.11.2025	9:00-10:00	O-229	S3 - Cultured cells	Maja Juković

	10:00-12:00	O-353	P3 - Bacterial culture	Maja Juković
19.11.2025	15:00-16:00	O-269	S4 - Lab calculations 3	Martina Mušković Lukić
20.11.2025	13:00-15:00	O-353	P4 - Cell culture	Maja Juković
24.11.2024	9:00-13:00	O-353	P5 - SDS PAGE	Matea Kršanac
	14:30-16:30	O-339	S5 - Cloning	Nicholas Bradshaw
25.11.2025	9:00-11:00	O-353	P6- PCR	Matea Kršanac
28.11.2025	9:00-12:00	O-353	P7 - Agarose Gels	Matea Kršanac
	14:00-15:30	O-269	Final exam	

* Date and time of the research topics lecture will dependent on availability of potential laboratory mentors, and will be provided closet to the time