KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Aquaculture - lecture	13.8.1325

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

2
Classes requiring the direct participation of an academic teacher:
ECTS: 1,5
Number of hours: 37 h:
-lectures: 30 h
-consultations with teacher: 5 h
-exam : 2 h

Student's own work:
ECTS: 0,5
Number of hours: 20 h
-preparation for the exam: 20 h

TOTAL: 57

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Examination

Assessment methods

- (mid-term / end-term) test
- written exam with open questions

The basic criteria for evaluation

Final grade is based on the grades from two mid-term colloquia (maximum 25 points each). A prerequisite for taking the exam is a positive (min 51%) passing of two mid-term colloquia

Method of verifying required learning outcomes

zakładany efekt kształcenia	multimedia-based lecture	doc movies and internet resources
	Knowledge	
KW_01	colloquium, exam	colloquium
	Skills	
KU_03	exam	discussion
	Competences	
KK_01	discussion, exam	discussion, exam

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

none

Aims of education

The aim of the class/course is to gain basic knowledge on the modern aquaculture sector that is an example of biotechnology including the sense of food production within the aquaculture, main species cultivated under control conditions, new strategies for development of sustainable food production with decreased carbon emission that involved biotechnological approach for fish feeding, fish health, reproduction and genetics.

Course contents

Aquaculture as an example of biotechnology.
Mile steps in development of aquaculture
Main species that are cultured under control condition.
Combating hunger by aquaculture.
Methods of fish and invertebrates cultivation; from ponds to cages, RAS and aquaponics.
Fish feeding and nutrition– trends and use of GM components in production of fish feeds?
Fish health and welfare – vaccinations, production of fish resistant to bacterial and virus disease. Genetics of disease resistance.
Reproduction and genetics in aquaculture – reproductive biotechnology.
Selective breeding programs in aquaculture.
Production of transgenic fish, oysters, algae.
Fish as model animals.
Conservative aquaculture
Processing of aquaculture species.
Aquaculture – prospects and limitations
Carbon footprint of the aquaculture – trends and challenges.

Bibliography of literature

A.1. used during the lectures
A.2. studied independently by the student

Pillay T.V.R and Kutty M.N. 2005. Aquaculture; Principles and practices (second Edition). Blackwell Publishing.
https://www.agrifs.ir/sites/default/files/AQUACULTURE.pdf
Beaumont A.R. and Hoare K. 2003. Biotechnology and Genetics in Fisheries and Aquaculture. Blackwell Sciences.
https://www.agrifs.ir/sites/default/files/Biotechnology_and_Genetics_in_Fisheries_and_Aquaculture_0.pdf
Overturf K. Molecular research in Aquaculture. Wiley. 2007.
Dunham R. Aquaculture and Fisheries Biotechnology. Genetic approach. CABI publishing. 2004.
John Liu. Aquaculture Genome Technologies 2007.
Zakęś Z. Biotechnologia w akwakulturze. Wydawnictwo IRS. 2008
Zwierzchowski L (red). Biotechnologia zwierząt. Wyd. Naukowe PWN. 1997.
Demska-Zakęś K. Innowacyjne techniki oceny biologicznej i ochrony cennych gatunków ryb hodowlanych i raków. Wydawnictwo IRS. 2008.

Supplementary literature
Scientific papers from the field of aquaculture and biotechnology published recently in specialized journals such as: Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

The learning outcomes (for the field of study and	**Knowledge**

specialization) P6/7U_W, P6/7U_WG KW_01 P6/7U_U, P6/7U_UW KU_03 P6/7U_K, P6/7U_KK KK_01	KW_01 Possesses a broad knowledge and understanding concerning production of food within aquaculture technologies and potential of fish, water invertebrates and plants for use in this sector. **Skills** KU_03 Potrafi biegle korzystać i krytycznie analizować dostępne informacje naukowe dotyczące akwakultury; na ich podstawie oraz na podstawie własnej pracy potrafi przygotować i przedstawić wystąpienie ustne lub/i pisemne opracowanie obejmujące szczegółowe zagadnienia w zakresie akwakultury i biotechnologii morskiej, stosując język naukowy w tym specjalistyczną terminologię i aparat pojęciowy; posiada umiejętność prowadzenia dyskusji **Social competence** KK_01 Has an ability to critically assess his own knowledge on aquaculture and is willing to constantly improve and update it.
Contact konrad.ocalewicz@ug.edu.pl	

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UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Aquaculture - laboratory	13.8.1323

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr inż. Marcin Kuciński

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 15 hours

ECTS credits

1
Classes requiring the direct participation of an academic teacher:
ECTS credits: 0,5
number of hours: 17 h
-laboratory classes: 15 h
-consultations: 2 h

Student's own work:
ECTS credits: 0.5
number of hours: 10 h
-preparation for lab work: 10 h

TOTAL: 27

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

project-based method (research, implementation, practical project)

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

assignment work – project or presentation

The basic criteria for evaluation

Presentation of the project of RAS to produce organisms within aquaculture. Both project and the presentation are graded (2-5) and final grade is based on these.

Method of verifying required learning outcomes

expected learning outcomes	project-based method (research, implementation, practical project)
	Knowledge
W_1 [KW_02_Bt]	project, presentation
	Skills
U_1 [KU_01_Og/Bt]	project, presentation
U_2 [KU_03]	project, presentation
	Competences
K_1 [KK_02]	project, presentation

Required courses and introductory requirements

A. Formal requirements
none

B. Prerequisites
none

Aims of education

The aim of the class/course is to gain basic knowledge on the modern aquaculture sector that is an example of biotechnology including the sense of food production within the aquaculture, main species cultivated under control conditions, new strategies for development of sustainable food production with decreased carbon emission that involved biotechnological approach for fish feeding, fish health, reproduction and genetics.

Course contents

A1: Designing of the experimental RAS Aquaponic system for fish, invertebrates and plant production.

Bibliography of literature

A.1. used during the lectures
A.2. studied independently by the student

Pillay T.V.R and Kutty M.N. 2005. Aquaculture; Principles and practices (second Edition). Blackwell Publishing.
https://www.agrifs.ir/sites/default/files/AQUACULTURE.pdf

Zakęś Z. Biotechnologia w akwakulturze. Wydawnictwo IRS. 2008
Zwierzchowski L (red). Biotechnologia zwierząt. Wyd. Naukowe PWN. 1997.
Demska-Zakęś K. Innowacyjne techniki oceny biologicznej i ochrony cennych gatunków ryb hodowlanych i raków. Wydawnictwo IRS. 2008.

Supplementary literature
Scientific papers from the field of aquaculture and biotechnology published recently in specialized journals such as: Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

The learning outcomes (for the field of study and specialization)

P6/7U_W, P6/7U_WG KW_02_Bt
P6/7U_U, P6/7U_UW KU_01_Og/Bt, KU_03
P6/7U_K, P6/7U_KK KK_02

Knowledge

W_1 [KW_02_Bt]: Has got complex knowledge on the aquaculture use of water resources including fish.

Skills

U_1 [KU_01] Has the ability to plan and carry out research in the laboratory, document the experiments and their results; can draw conclusions based on the observations made during the field trip to the aquaculture farm and results obtained during the laboratory activities.
U_2 [KU_02] Can collect and interpret empirical data on the cultivated organisms; applies statistical methods and computer tools in data analysis; formulates conclusions based on empirical data.

Social competence

K_1 [KK_02] Is ready to plan and organize efficiently individual and team work, especially in laboratory and aquaculture farm, is ready to plan individual

	professional carrer and work in a enterprising way.

Contact

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NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Aquaculture - field training	13.8.1324

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr inż. Marcin Kuciński; mgr Ligia Panasiak

Forms of classes, the realization and number of hours

Forms of classes

Field classes

The realization of activities

classes outside UG premises, classroom instruction

Number of hours

Field classes: 15 hours

ECTS credits

1
Classes requiring the direct participation of an academic teacher:
ECTS credits: 0,5
number of hours: 17 h
-classes: 15 h
-consultations: 2 h

Student's own work:
ECTS credits: 0.5
number of hours: 10 h
preparation for field work: 10 h

TOTAL: 27

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

discussion

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- assignment work – project or presentation
- preparation of report from the field work

The basic criteria for evaluation

The final grade is based on grades scored for the writing report from the field trip (up to 30 points/grades) and the presentation on the current important topics for aquaculture (up to 30 points/grades). Grades in accordance with the Study Regulations UG

Method of verifying required learning outcomes

expected learning outcomes	Discussion	visit to the aquaculture farm
	Knowledge	
W_1 [KW_02_Bt]	presentation	report
	Skills	
U_1 [KU_01]		report
U_2 [KU_03]	presentation	report
	Competences	
K_1 [KK_02]	presentation	report

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

none

Aims of education

The aim of the class/course is to gain basic knowledge on the modern aquaculture sector that is an example of biotechnology including the sense of food production within the aquaculture, main species cultivated under control conditions, new strategies for development of sustainable food production with decreased carbon emission that involved biotechnological approach for fish feeding, fish health, reproduction and genetics.

Course contents

Practical training:
A1: Visit to the fish farm - breeding of fish under control conditions.
A2: Hot topics in world and local aquaculture – panel discussion and presentations

Bibliography of literature

A.1. used during the classes
Zakęś Z. Biotechnologia w akwakulturze. Wydawnictwo IRS. 2008
Demska-Zakęś K. Innowacyjne techniki oceny biologicznej i ochrony cennych gatunków ryb hodowlanych i raków. Wydawnictwo IRS. 2008.
A.2. studied independently by the student
Zwierzchowski L (red). Biotechnologia zwierząt. Wyd. Naukowe PWN. 1997.
Pillay T.V.R and Kutty M.N. 2005. Aquaculture; Principles and practices (second Edition). Blackwell Publishing.
https://www.agrifs.ir/sites/default/files/AQUACULTURE.pdf
Beaumont A.R. and Hoare K. 2003. Biotechnology and Genetics in Fisheries and Aquaculture. Blackwell Sciences.
https://www.agrifs.ir/sites/default/files/Biotechnology_and_Genetics_in_Fisheries_and_Aquaculture_0.pdf
Overturf K. Molecular research in Aquaculture. Wiley. 2007.
Dunham R. Aquaculture and Fisheries Biotechnology. Genetic approach. CABI publishing. 2004.
John Liu. Aquaculture Genome Technologies 2007.

Supplementary literature
Scientific papers from the field of aquaculture and biotechnology published recently in specialized journals such as: Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

The learning outcomes (for the field of study and specialization)

P6/7U_W, P6/7U_WG KW_02_Bt
P6/7U_U, P6/7U_UW, P6/7U_UO KU_01, KU_03
P6/7U_K, P6/7U_KK KK_02

Knowledge

W_1 [KW_02]: Has got significant knowledge on food production within aquaculture and knows potential of fish, water invertebrates and plants to be used in this sector (A1, 2).

Skills

U_1 [KU_01] Has the ability to plan and carry out research in the laboratory, document the experiments and their results; can draw conclusions based on the observations made during the field trip to the aquaculture farm and results obtained

	during the laboratory activities (A1, 2). U_2 [KU_03] Has knowledge and ability for critical analysis of available scienctific data and based on these is able to prepare oral presentation and written study related to issues connected with aquaculture using scientific language and terminology. Has ability to moderate scientific discussion (A1, 2).
	Social competence
	K_1 [KK_02] Is ready to plan and organize efficiently individual and team work, especially in laboratory and aquaculture farm, is ready to plan individual professional carrer and work in a enterprising way. (A2).

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Biodiversity of marine organisms - lecture	13.8.1327

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr hab. Agata Weydmann-Zwolicka, profesor uczelni; dr Anna Toruńska-Sitarz

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

2
ECTS credits - 2
classes: 30 hours,
consultations: 5 hours,
student's own work: 15 hours
TOTAL: 50 hours

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- Quiz, Jigsaw classroom
- discussion
- multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Examination

Assessment methods

- written exam with open questions
- written exam (test)

The basic criteria for evaluation

The evaluation covers the content indicated in the syllabus field "Course contents."
The student must obtain a grade of at least sufficient from each assessed learning effect.
The final (passing) grade is a percentage indicator included in the UG Studies Regulations.

Method of verifying required learning outcomes

Egzamin z otwartymi pytaniami lub pytaniami testowymi

Learning outcome	Multimedia presentation	Discussion	Quiz, Jigsaw classroom
	Knowledge		

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

Basic knowledge on biology.

Aims of education

At the end of the course student will be able to:
Identify and classify marine organisms based on the current taxonomy and systematics.
Discuss the possibilities and limitations of biodiversity studies.
Explain mechanisms responsible for diversification of fish species.

Course contents

1. Structural and functional diversity of marine microbes (Archaea, Bacteria, Fungi, Microalgae).
2. Culture-independent approaches to studying microbial communities.
3. Marine viruses.
4. Diversity of pelagic invertebrates.
5. Diversity of benthic invertebrates.
6. Methods of measuring invertebrate diversity.
7. Invertebrate fisheries and aquaculture.
8. Biotechnological potential of marine invertebrates.
9. Fishes – large number of species and huge variation of phenotypes.
10. Evolution of the fish genome and whole genome duplication events.
11. Adaptive radiation and introgression.
12. Genetic variation of the fish stocks. Consequences of the fish stocks overexploitation.

Bibliography of literature

1. Munn C.B., Marine Microbiology Ecology & Applications, CRC Press
2. Levinton J. Marine Biology, Oxford University Press
3. Volf J-N. 2005. Genome evolution and biodiversity of teleost fish. Heredity 94; 280-294.
4. Johanson Z. et al. 2019. Evolution and development of Fishes. Cambridge University Press.
5. Helfman G. 2009. The diversity of Fishes. Biology, evolution and Ecology. Wiley-Blackwell.
6. Set of up-to-date scientific papers selected by the teaching staff.

The learning outcomes (for the field of study and specialization)

KW_01

Knowledge

KW_01 The student possess a broad knowledge and understanding of the range and value of the diversity of marine organisms; knows the classical and modern tools used to study the biodiversity of Archaea, Bacteria, Eukaryotes, and Viruses.

Skills

Social competence

Contact

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Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Biodiversity of marine organisms - laboratory	13.8.1326

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr hab. Agata Weydmann-Zwolicka, profesor uczelni; dr Anna Toruńska-Sitarz

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 30 hours

ECTS credits

2
ECTS credits - 2
classes: 30 hours
consultations: 5 hours
student's own work: 15 hours
TOTAL 50 hours

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- Data analysis
- conducting experiments
- critical incident (case) analysis
- designing experiments
- discussion
- group work

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- assignment work – completing a specific practical assignment
- graded course credit based on individual grades obtained during the semester

The basic criteria for evaluation

The evaluation covers the content indicated in the syllabus field "Course contents."
The student must obtain a grade of at least sufficient from each assessed learning effect.
The final (passing) grade is a percentage indicator included in the UG Studies Regulations.

Method of verifying required learning outcomes

Learning outcomes	Group work	Experiment design	Discussion	Problem based learning	Experiment performance	Data analysis
	Skills					
K_U1	Completion of credit work - completion of specified practical work. Weighted average of partial grades. Observation of laboratory work.		Observation of laboratory work.	Weighted average of partial grades.	Completion of credit work - completion of specified practical work. Weighted average of partial grades.	
K_U2	Completion of credit work - completion of specified practical work. Weighted average of partial grades. Observation of laboratory work.		Observation of laboratory work.	Weighted average of partial grades.	Completion of credit work - completion of specified practical work. Weighted average of partial grades.	

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

Basic knowledge on biology.

Aims of education

At the end of the course students will be able to:
Demonstrate current research practice and methodologies in the field of biodiversity.
Discuss the possibilities and limitations of biodiversity studies.
Design and execute experiments related to metabarcoding of the marine environments.
Perform analysis of the genetic variation.

Course contents

1. Metabarcoding of marine environmental samples.
1.1 Methods of eDNA extraction (e.g. water, sediments).
1.2 Methods of invertebrate DNA extractions.
1.3 Selection of appropriate DNA barcode markers; PCR optimization.
1.4 Bioinformatic analyses.
2. Analysis of invertebrate samples from different environments (water column, sea bottom).
3. Analysis of the genetic condition of chosen fish species from the Baltic Sea.

Bibliography of literature

Instructions prepared by the teaching staff.
Set of up-to-date scientific papers selected by the teaching staff (including SOP, protocols, white papers etc.).

The learning outcomes (for the field of study and specialization)

KU_01
KU_02

Knowledge

Skills

KU_01 Student has the ability to plan and carry out research in the laboratory, document the experiments and their results; can use laboratory equipment under the guidance of teaching staff; applies the principles of safety rules and good laboratory practices.
KU_02 Student can collect and interpret empirical data on the biodiversity of marine organisms; applies statistical methods and computer tools in data analysis; formulates conclusions based on empirical data.

Social competence

Contact

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NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Microbial Biotechnology - tutorials	13.4.0256

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr Dorota Pomorska

Forms of classes, the realization and number of hours

Forms of classes

Auditorium classes

The realization of activities

classes outside UG premises, classroom instruction, online classes

Number of hours

Auditorium classes: 30 hours

ECTS credits

2
Tutorials – 30 h
Student's own work – 20 h
TOTAL 50 h – 2 ECTS

The academic cycle

2023/2024 winter semester

Type of course

- an elective course
- obligatory

Language of instruction

English

Teaching methods

- - project-based method (research, implementation, practical project)
- educational technology
- consultation
- student's own work
- discussion
- group work
- project-based method (research, implementation, practical project)
- text analysis and discussion

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- - graded course credit based on individual grades obtained during the semester
- assignment work – project or presentation

The basic criteria for evaluation

Each of the learning outcomes will be assessed. Students must obtain at least a satisfactory grade for every assessed learning outcome. The assessment will be based on observation of the student's work during the semester (evaluation of student's ability to discuss and present the research problem).

Method of verifying required learning outcomes

The assessment will be based on:
- oral presentation - the ability to use source materials, present the scientific problem, use specialist terminology and graphic form of presentation (KU_03).
- activity and contribution to group discussion (KW_04, KK_04)

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

Knowledge, skills and competences as the learning outcomes of the first - cycle studies in the field of oceanography or biotechnology or similar learning outcomes obtained in another field of study

Aims of education

The course aim is:

Acquisition by students of knowledge concerning microbial biotechnological methods applied to solve problems in life science. (KW_04). Acquisition of the ability to prepare and make in English a short oral presentation, using scientific language, including specialist terminology and notional apparatus suitable for the conducted research, and to participate in a discussion (KU_03). Student will be aware of risks and dilemmas connected to scientific research and laboratory work (KK04).

Course contents

The course covers an overview of current important microbial biotechnology methods used in bioscience. The course includes an overview of microbes (e.g., bacteria, viruses and yeast) and genetic engineering technics that have found practical application in microbial biotechnology and help to deal with various bioscience issues.

Bibliography of literature

Molecular cloning - A laboratory manual by Sambrook, Fritsch and Maniatis
Molecular cloning - A laboratory manual. 4thedition, (2012) Green, Sambrook
Microbial Biotechnology: Fundamentals of Applied Microbiology 2nd Edition, (2007), Glazer, Nikaido
Materials prepare by tutor and students

The learning outcomes (for the field of study and specialization)

KW_04
KU_03
KK_04

Knowledge

KW_04 Knows and understands well advanced research methods used in marine biotechnology and related sciences

Skills

KU_03 Understands an utterance and reads with understanding scientific literature and simple reviews in the fields of science and scientific disciplines connected with marine biotechnology; can prepare a short written review and an oral presentation in English (using scientific language), concerning particular issues of marine biotechnology and related scientific areas and disciplines, has an ability to participate in a discussion

Social competence

KK_04 Is ready to assess and understand the risks and dilemmas, including ethical dilemmas, associated with conducting scientific research and introducing advanced technologies; understands and appreciates the importance of intellectual property; behaves ethically

Contact

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Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Microbial Biotechnology - laboratory	13.4.0257

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr Dorota Pomorska

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction, online classes

Number of hours

Laboratory classes: 30 hours

ECTS credits

2
Classes – 30 h
Student's own work – 20 h
TOTAL 50 h – 2 ECTS

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- conducting experiments
- critical incident (case) analysis
- discussion
- group work
- individual student's work
- educational technology

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- (mid-term / end-term) test
- assignment work – project or presentation
- - graded course credit based on individual grades obtained during the semester
- (mid-term/end-term) test

The basic criteria for evaluation

Each of the learning outcomes will be assessed. Students must obtain at least a satisfactory grade for every assessed learning outcome. The assessment will be based on observation of the student's work during the semester (evaluation of student's ability to discuss and present the research problem).

Method of verifying required learning outcomes

The assessment will be based on:
- observation of students work (KU_01, KK_02, KK_03)
- experimental documentation – reports (KU_01, KK_02)
-writing test with open and closed questions (KU_01, KK_02, KK_03)
- activity and contribution to group discussion (KK_02)

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

Knowledge, skills and competences as the learning outcomes of the first - cycle studies in the field of oceanography or biotechnology or similar

learning outcomes obtained in another field of study

Aims of education

The course aim is:

Acquisition by students of knowledge concerning microbial biotechnological methods applied to solve problems in life science. (KW_04). Acquisition of the ability to prepare and make in English a short oral presentation, using scientific language, including specialist terminology and notional apparatus suitable for the conducted research, and to participate in a discussion (KU_03). Student will be aware of risks and dilemmas connected to scientific research and laboratory work (KK04).

Course contents

The course covers an overview of current important microbial biotechnology methods used in bioscience. The course includes an overview of microbes (e.g., bacteria, viruses and yeast) and genetic engineering technics that have found practical application in microbial biotechnology and help to deal with various bioscience issues.

Bibliography of literature

Molecular cloning - A laboratory manual by Sambrook, Fritsch and Maniatis
Molecular cloning - A laboratory manual. 4thedition, (2012) Green, Sambrook
Microbial Biotechnology: Fundamentals of Applied Microbiology 2nd Edition, (2007), Glazer, Nikaido
Materials prepare by tutor and students

The learning outcomes (for the field of study and specialization)

KU_01
KK_02
KK_03

Knowledge

Skills

KU_01 Can organize and realize research in the laboratory and at sea and can document activities and results; is able to use laboratory devices under the supervision of the tutor; applies the Health and Safety Rules

Social competence

KK_02 Can effectively plan and organize personal and team work in the laboratory and at sea
KK_03 Is able to apply the Health and Safety rules during working in the laboratory and during sea expedition; is prepared to take full responsibility for his own safety and for safety of others, and is able to recognize threats, and is capable of taking appropriate actions.

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Marine biotechnology in a real world - lecture	13.4.0263

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr Agnieszka Bernat-Wójtowska

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 15 hours

ECTS credits

1
Lecture – 15 h
Student's own work – 10 h

TOTAL: 25 h – 1 ECTS

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- -Multimedia-based lecture, panel discussion
- multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- test
- (mid-term / end-term) test

The basic criteria for evaluation

According to the Regulations of the University of Gdańsk Studies

Method of verifying required learning outcomes

Learning outcomes	Veryfication method
KW_04	test
KU_03	test/discussion
KK_01	test/discussion

Required courses and introductory requirements

A. Formal requirements
B. Prerequisites

Aims of education

The aim of this course is to present students' latest findings in marine biotechnology; discuss diverse examples documenting the application of marine organism and marine products in various areas of our live. Lectures will be conducted by invited guests from various research institutions in Poland and abroad.

Course contents

Presentation of success stories in the area of marine biotechnology.
Presentation of currently conducted studies aimed at commercialization of marine-derived-product
Other aspects of marine biotechnology

Bibliography of literature

The list of published materials will be suggested by the lecturers

The learning outcomes (for the field of study and specialization)

KW_04
KU_03
KK_01

Knowledge

KW_04 knows and understands advanced methods used in marine biotechnology

Skills

KU_03 is able to discuss actively the problems presented during lecture

Social competence

KK_01 is ready to critically evaluate the knowledge possessed and the received contents of the subject

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
English language	9.0.6624

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

mgr Joanna Makara; mgr Violetta Dużyńska; mgr Beata Pawłowska; mgr Agnieszka Błaszkowska; mgr Renata Korzeniowska; mgr Paweł Kwiatkowski

Forms of classes, the realization and number of hours

Forms of classes

Language classes

The realization of activities

classroom instruction

Number of hours

Language classes: 30 hours

ECTS credits

2

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

- Polish in 10.00%
- English in 90.00%

Teaching methods

discussion

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

The basic criteria for evaluation

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements
B. Prerequisites

Aims of education

Course contents

Bibliography of literature

The learning outcomes (for the field of study and specialization)

Knowledge

Skills

Social competence

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Marine natural products - lecture	13.8.1333

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. dr hab. Hanna Mazur-Marzec; prof. UG, Sylwia Jafra; dr Andrea Lipińska

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

2
ECTS credits -2
Lecture: 30 h
Student's own work: 20 h
Consultations - 5 h
TOTAL: 55 h

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Examination

Assessment methods

- written exam with open questions
- oral exam

The basic criteria for evaluation

Exam: written part (obligatory): test with questions, including open questions. Positive grade if the number of points ≥ 51%. For students having between 41% and 50% the oral examination is obligatory. Students with the number of points ≤ 41% do not pass the final test; oral part (obligatory for students having between 41% and 50% from the written part and facultative for students with ≥ 51%): discussion on three problems related to the topic, selected by the teacher;

Method of verifying required learning outcomes

Learning outcomes	Lecture with presentation
	Knowledge
KW_W01	exam/tests
	Skills
	Competences

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

Aims of education

Acquisition by student knowledge on the main producers of bioactive marine products (MNPs), structure, activity and biotechnological potential of MNPs (KW_01).
Student also acquires knowledge of model organisms of the marine environment used for the interaction studies and as a potential source o MNPs (KW_01)

Course contents

Historical background and branches of marine biotechnology, main producers of biotechnologically important MNPs, natural and alternative sources of bioproducts, structural diversity of MNP, low value MNPs (food, feed and energy) and high added value MNPs (enzymes, drugs, cosmeceuticals, nutraceuticals, functional food, food supplements, pigments, biomaterials, antifouling agents), from hits to lead, biotechnological application of MNPs - case studies, from biomass to bioproduct.
Model organisms of marine ecosystem – interactions (ameba-Legionella, sociobiology of sponges and corals); potential source of MNPs (e.g fluorescent proteins, enzymes)

Bibliography of literature

Se-Kwon Kim., 2019. Essential of Marine Biotechnology. Springer Nature Switzerland AG, ISBN: 9783030209438
Selected articles from scientific journals, e.g.: Marine Drugs (MDPI), Marine Biotechnology (Springer) provided by the teacher

The learning outcomes (for the field of study and specialization)

KW_01

Knowledge

KW_01 Student possesses knowledge about the diversity and biotechnological potential of marine natural products

Skills

Social competence

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Marine natural products - laboratory	13.8.1332

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. dr hab. Hanna Mazur-Marzec; mgr Robert Konkel

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 15 hours

ECTS credits

1
ECTS credits -1
Laboratory classes: 15 h
Student's own work: 10 h
Consultations - 3 h
TOTAL: 28 h

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

conducting experiments

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- (mid-term / end-term) test
- assignment work – completing a specific practical assignment

The basic criteria for evaluation

Exam: written part (obligatory): test with questions, including open questions. Positive grade if the number of points ≥ 51%. For students having between 41% and 50% the oral examination is obligatory. Students with the number of points ≤ 41% do not pass the final test; oral part (obligatory for students having between 41% and 50% from the written part and facultative for students with ≥ 51%): discussion on three problems related to the topic, selected by the teacher;

Method of verifying required learning outcomes

Learning outcomes	Lecture with presentation
	Knowledge
	Skills
KU_01	test, report, student's activity during laboratory classes
	Competences
KK_03	Student's performance during laboratory classes

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

Aims of education

- Familiarizing with main methods used for isolation and characterization of MNPs (KU_01)
- Acquisition by students the ability to perform laboratory experiments in line with the safety regulations (KK_03)

Course contents

Historical background and branches of marine biotechnology, main producers of biotechnologically important MNPs, natural and alternative sources of bioproducts, structural diversity of MNP, low value MNPs (food, feed and energy) and high added value MNPs (enzymes, drugs, cosmeceuticals, nutraceuticals, functional food, food supplements, pigments, biomaterials, antifouling agents), from hits to lead, biotechnological application of MNPs - case studies, from biomass to bioproduct. Model organisms of marine ecosystem – interactions (ameba-Legionella, sociobiology of sponges and corals); potential source of MNPs (e.g fluorescent proteins, enzymes)

Bibliography of literature

Se-Kwon Kim., 2019. Essential of Marine Biotechnology. Springer Nature Switzerland AG, ISBN: 9783030209438
Selected articles from scientific journals, e.g.: Marine Drugs (MDPI), Marine Biotechnology (Springer) provided by the teacher

The learning outcomes (for the field of study and specialization)

KU_01
KK_03

Knowledge

Skills

KU_01 Possess the ability to perform laboratory experiments, isolate marine natural products and characterize their chemical properties

Social competence

KK_03 Is ready to perform laboratory experiments in accordance with safety regulations

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI
Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego
UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title

Pathology and molecular diagnostics of aquatic organisms - lectures

ECTS code

13.8.1335

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr hab. Mariusz Grinholc, profesor uczelni

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

2
Classes requiring the direct participation of an academic teacher:
ECTS credits: 1,5
Number of hours: 37 h:
-lectures: 30 h
-consultations with teacher: 5 h
-exam : 2 h

Student's own work:
ECTS credits: 0,5
Number of hours: 20 h
-preparation for the exam: 20 h

TOTAL: 55

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Examination

Assessment methods

- written exam with open questions
- two mid-term colloquia

The basic criteria for evaluation

Final grade is based on the grades from two mid-term colloquia (maximum 25 points each). A prerequisite for taking the exam is a positive (min 51%) passing of two mid-term colloquia.
Writing exam (test) plus one descriptive problem. Grades in accordance with the Study Regulations UG.

Method of verifying required learning outcomes

Expected learning outcome	multimedia-based lecture
	Knowledge
KW_03	exam
KW_04	exam
	Skills
KU_03	exam
	Competences
KK_04	exam

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

none

Aims of education

The aim of the lectures is to gain theoretical knowledge on the main methods of cellular and molecular diagnostics used in the farmed and wild organisms from the water environment. Students get theoretical skills related to collecting samples for the laboratory analysis, extraction and storage of molecules and cells and their further analysis to detect pathogens, evaluate ploidy status, identify interspecies hybrids and confirm genetic sex of examined individuals.

Course contents

Lectures:
block 1
Introduction to molecular diagnostics in aquatic organisms. Main challenges and ways to solve them out.
Organization of prokaryotic genomes and regulation of gene expression.
Organization of eukaryotic genomes and regulation of gene expression.
Collecting and storage of biological material for diagnostics.
Extraction and storage of nucleic acids.
block 2
Cytogenetic diagnostics in aquaculture – chromosome preparation and analysis: cytogenetic microscope analysis of hybrids, chimers, poliploids, sex chromosomes and chromosome aberrations and polymorphisms. Conventional chromosome banding, fluorescent in situ hybridization (FISH).
PCR based molecular diagnostics; methods and application in aquaculture.
Methods of DNA sequencing and their application in aquatic organisms.
Histological techniques in fish disease and reproductive biology.
block 3
RT-PCR – examination of gene expression in toxicological studies of the marine environment.
Pathogens and main diseases in aquaculture – viruses; VHS, IPN, IHN: symptoms and consequences.
Bacterial disease in aquatic organisms.
Application of vaccines in fish and invertebrates cultured under controlled conditions.
Molecular diagnostics of fish disease – from PCR to RT-PCR
Molecular identification of aquaculture originated food.

Bibliography of literature

A.1. used during the lectures

Maj-Paluch, J., Richert R. 2016. Charakterystyka wirusa zakaźnej martwicy trzustki ryb łososiowatych I jego identyfikacja. Med. Weter. 72(4), 222-225.
Fadaeifard F., et al. 2013. Multiplex PCR assay for detection of VHS, IPN and IHN in eyed egg, fry and broodstock of rainbow trout…J Pure Apll Microbiol. 7(4); 2838-2844.
Cunnigham C.O. 2002. Molecular diagnosis of fish and shellfish diseases: present status and potential use in disease control. Aquaculture. 206; 19-55.
Moreira M. et al. 2021. Fish pathology research in aquaculture of farmed fish; a proteomic perspective. Animals. 2021 Jan 8.
Haghighi Khiabanian asl, A. et al. 2008. Diagnosis of viral hemorrhagic septicemia (VHS) in Iranian rainbow trout aquaculture by pathology and molecular techniques. Bull. Eur. Fish Pathol. 28(5), 2008, 170.
Piotr Węgleński, Genetyka Molekularna, Wydawnictwo Naukowe PWN, 2008

Jerzy Bal, Biologia molekularna w medycynie, Wydawnictwo Naukowe PWN 2008
Pisano E., Ozouf-Costaz C., Foresti F., Kapoor BG, Fish Cytogenetics. Science Publisher, 2007.
Charon K.M., Świtoński M. Genetyka zwierząt. Wydawnictwo naukowe PWN. 2008.
Overturf K. Molecular research in Aquaculture. Wiley. 2007.
Demska-Zakęś K. Innowacyjne techniki oceny biologicznej i ochrony cennych gatunków ryb hodowlanych i raków. Wydawnictwo IRS. 2008
A.2. studied independently by the student

Scientific papers from field of aquaculture and biotechnology published recently in specialized journals such as: Journal of Fish Disease, Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

Supplementary literature
Scientific papers related to the topics of the subject published recently in specialized journals such as: Journal of Fish Disease, Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

The learning outcomes (for the field of study and specialization)

P6/7U_W, P6/7U_WG KW_03 KW_04
P6/7U_U, P6/7U_UW KU_03
P6/7U_K, P6/7U_KO KK_03

Knowledge

KW_03 Possesses a broad knowledge and understanding concerning pathology of the cultured aquatic organisms and application of molecular tools for diagnostics of viral and bacterial infections, ploidy level, disturbances on the gonadal development.
KW_04 Possesses a broad knowledge on the advanced methods used in the molecular diagnostics of cultured aquatic organisms.

Skills

KU_01 Has the ability to plan and carry out research in the molecular diagnostic laboratory, document the experiments and their results; can draw conclusions based on results obtained during the laboratory activities.

Social competence

KK_04 Is ready to evaluate and understand problems and ethical dillemas related to scientific research within molecular diagnostics and introducing advanced technologies, understands and appreciates intellectual properties, acts ethically.

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Pathology and molecular diagnostics of aquatic organisms - laboratories	13.8.1334

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. UG, dr hab. Konrad Ocalewicz; dr hab. Mariusz Grinholc, profesor uczelni; dr inż. Marcin Kuciński; dr Magda Rybicka-Misiejko; mgr Ligia Panasiak

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 20 hours

ECTS credits

2
Classes requiring the direct participation of an academic teacher: :
ECTS credits: 1,5
number of hours: 35 h
-laboratories: 20 h
-consultations with teacher: 10 h
-participation in colloquia: 5 h

Student's own work:
ECTS crdits: 0.5
number of hours: 20 h
-preparation for lab work and tests: 20 h

TOTAL: 55

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

conducting experiments

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- writing reports after each laboratory class, two mid-semester colloquia (open questions),
- ssignment work – conducting research and presenting results
- graded course credit based on individual grades obtained during the semester

The basic criteria for evaluation

The final grade is based on grades scored for the writing report from the laboratory classes (up to 30 points/grades) and two mid-term colloquia (maximum 25 points each). Grades in accordance with the Study Regulations UG

Method of verifying required learning outcomes

expected learning outcome	conducting experiments
	Knowledge
KW_04_Og/Bt	report, mid-term colloquia
	Skills
KU_01_Og/Bt	report, mid-term colloquia
	Competences
KK_03	report, mid-term colloquia

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

none

Aims of education

The aim of the class/course is to gain practical knowledge on the main methods of cellular and molecular diagnostics used in the farmed and wild organisms from the water environment. Students get theoretical and practical skills related to collecting samples for the laboratory analysis, extraction and storage of molecules and cells and their further analysis to detect pathogens, evaluate ploidy status, identify interspecies hybrids and confirm genetic sex of examined individuals.

Course contents

Practical training:
Histological and cytogenetic characteristics of fish with disturbed gonadal development.
Diagnostics of genetic sex of sex-reversed fish.
RT-PCR application for identification of VHS, IHN and IPN viruses.

Bibliography of literature

A.1. used during the lab work
Maj-Paluch, J., Richert R. 2016. Charakterystyka wirusa zakaźnej martwicy trzustki ryb łososiowatych I jego identyfikacja. Med. Weter. 72(4), 222-225.
Fadaeifard F., et al. 2013. Multiplex PCR assay for detection of VHS, IPN and IHN in eyed egg, fry and broodstock of rainbow trout…J Pure Apll Microbiol. 7(4); 2838-2844.
Haghighi Khiabanian asl, A. et al. 2008. Diagnosis of viral hemorrhagic septicemia (VHS) in Iranian rainbow trout aquaculture by pathology and molecular techniques. Bull. Eur. Fish Pathol. 28(5), 2008, 170.
Demska-Zakęś K. Innowacyjne techniki oceny biologicznej i ochrony cennych gatunków ryb hodowlanych i raków. Wydawnictwo IRS. 2008

A.2. studied independently by the student
Scientific papers from field of aquaculture and biotechnology published recently in specialized journals such as: Journal of Fish Disease, Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

Supplementary literature
Scientific papers related to the topics of the subject published recently in specialized journals such as: Journal of Fish Disease, Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.

The learning outcomes (for the field of study and specialization)

P6/7U_W, P6/7U_WG KW_04_Og/Bt
P6/7U_U, P6/7U_UW, P6/7U_UO KU_01_Og/Bt
P6/7U_K, P6/7U_KO KK_03

Knowledge

W_1 [KW_04_Og/Bt] knows and understand advanced metods used in moleuclar diagnostics of fish and fields related to (A1-3).

Skills

U_1 [KU_01] Has the ability to plan and carry out research in the molecular diagnostic laboratory, document the experiments and their results; can draw conclusions based on results obtained during the laboratory activities (A1-3).

Social competence

K_1 [KK_03] Works with strict compliance of health and safety standards in the

	molecular diagnostic laboratory (A1-3).

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title

Principles of molecular and cellular biology

ECTS code

13.4.0261

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr Andrea Lipińska; prof. dr hab. Igor Konieczny; dr hab. Robert Czajkowski, profesor uczelni; dr Katarzyna Węgrzyn

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

2
Classes 30 h
Student's own work 20 h

TOTAL 50 h – 2 ECTS

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- classroom instruction
  gamification (quizz, small graphical projects)
  consultation
  student's own work
- multimedia-based lecture
- problem-focused lecture
- seminar lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- graded course credit based on individual grades obtained during the semester
- test with open and closed question

The basic criteria for evaluation

L1 – Number of points evaluating knowledge provided in the L1 part of lectures, 30 points max.
L2 - Number of points evaluating knowledge provided in the L2 part of lectures, 30 points max.
L3 - Number of points evaluating knowledge provided in the L3 part of lectures, 30 points max.
L4 – Number of points from additional tasks (like internet quizzes, small graphical projects, flashcards) evaluating knowledge provided in parts L1-L2-L3 of the lectures, 10 points max.
W = L1+L2+L3+L4 = Total number of points making the basis of the final grade, calculated according to the Study Regulations. To pass the course a minimum of 51% of points must be collected.
Detailed criteria, form of assessment, and timetable of evaluation for each part of lectures will be provided by lecturers during the first lectures.

Method of verifying required learning outcomes

The learning outcome	Method of verifying
KW_02_Bt	Written test with open and closed questions for the parts L1-L2-L3. Modern verifying methids (quizz with short open/test questions, short written projest like flashcards, graphical projects).
KW_03_Og/Bt	Written test with open and closed questions for the parts L1-L2-L3
KW_04_Og/Bt	Written test with open and closed questions for the parts L1-L2-L3

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

Aims of education

The aim of this course is to consolidate (as repetition) basic knowledge of molecular and cellular biology and to upgrade the knowledge required to understand molecular processes employed in biotechnology to the advanced level, also by explaining the methodology applied in the analyses of these processes [KW_04_Og/Bt]. The knowledge will include examples of marine organisms, which will allow the students to understand the meaning of molecular and cellular for organisms, marine environment, and marine biotechnology (blue biotechnology [KW_03_Og/Bt]]. The student will consolidate the knowledge about the architecture of prokaryotic and eukaryotic cells, the organization of their genomes, and extrachromosomal genetic elements, with an emphasis on differences between organisms from the two domains of life. The student will consolidate basic knowledge and will gain advanced knowledge on the complex molecular processes of gene expression, and the mechanisms of their regulation, with an emphasis on the molecular processes, applied in genetic engineering and marine biotechnology [KW_03_Og/Bt]. The student will consolidate basic knowledge and acquire advanced knowledge on protein maturation and other important cellular processes. Completing this course, the student will be able to indicate potential targets for manipulations in molecular and cellular processes for use in biotechnology, e.g., with the use of marine bioproducts. This way, the student will gain advanced knowledge of potential applications of marine resources [KW_02_Bt].

Course contents

Lectures

Part W1:

1. Architecture of a prokaryotic cell 2h (Robert Czajkowski)
2. Genomic organization in prokaryotic cells 1h (Robert Czajkowski)
3. Architecture of a eukaryotic cell. Differences between eukaryotic and prokaryotic cells. Genomic organization in eukaryotic cells 3h (Andrea Lipińska)

Part W2:

Stages of gene expression in eukaryotic cells; Synthesis of DNA and RNA (replication, transcription) 4h (Katarzyna Węgrzyn)
Reverse transcription. Synthesis of rRNA, tRNA, microRNA. Posttranscriptional processing of nucleic acids in eukaryotes 2h (Andrea Lipińska)
Regulation of gene expression in prokaryotes (operones, two-component system, QS). Inherritance of geneteic information (vertical transfer, horizontal transfer) 2h (Katarzyna Węgrzyn)
Extrachromosomal genetic elements (transpozones, plasmids 2h (Igor Konieczny)
DNA repair. Mutagenesis and genetic variation, homologous recombination, site-directed recombination 2h (Katarzyna Węgrzyn)
Principles of genetic engineering (R-M systems, CRISPR-CAS, toxin-antitoxin (TA)) 1h (Katarzyna Węgrzyn)
Translation and its inhibitors, self-cleaving peptides 2h (Andrea Lipińska)
Protein folding and degradation 1h (Andrea Lipińska)
Posttranslational protein modifications and subcellular transport 2h (Andrea Lipińska)

Part W3:

Cell cycle and its perturbations 1h (Andrea Lipińska)
Principles of immune response 2h (Andrea Lipińska)
Stem cells and cell ageing, the role of telomers, cell death 1h (Andrea Lipińska)
Oncogenesis 1,5h (Andrea Lipińska)
Inhibitors of gene expression and subcellular transport, with examples of inhibitors of marine origin 0,5h (Andrea Lipińska)

Bibliography of literature

Essential Literature:

Academic books:

Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick: Lewin's GENES XII 12th Edition. Jones & Bartlett Learning; 12th edition (Edition 2017 or newer).
Bruce Alberts, Rebecca Heald, Alexander Johnson, David Morgan, Martin Raff, Keith Roberts, Peter Walter, John Wilson, Tim Hunt. Molecular Biology of the Cell, Seventh Edition. W. W. Norton & Company (Edition 2022 or newer).
Bruce Alberts, Karen Hopkin, Alexander Johnson, David Morgan, Martin Raff. Essential Cell Biology, 5th International Student Edition (Edition 2018 or newer).
George Ploppler. Principles of Cell Biology. Jones & Bartlett Publishers (Edition 2011 or newer). or equivalent academic book on molecular and cell

biology.

Supplementary materials: Publications recommended by lecturers during lectures.

The learning outcomes (for the field of study and specialization)	Knowledge
KW_02_Bt KW_03_Og/Bt KW_04_Og/Bt	Student: KW_02_Bt Possesses advanced knowledge of potential biotechnological applications of marine resources KW_03_Og/Bt Knows and understands complex biological processes on a molecular level, understands their meaning for an organism, marine environment and marine biotechnology KW_04_Og/Bt Knows and understands on a deep level advanced research methodology used in marine biotechnology and related sciences
	Skills
	Social competence

Contact

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KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title	ECTS code
Research cruise I	13.8.1336

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Oceanografii i Geografii	Marine Biotechnology	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

prof. dr hab. Hanna Mazur-Marzec; mgr Robert Konkel

Forms of classes, the realization and number of hours

Forms of classes

Field classes

The realization of activities

classes outside UG premises

Number of hours

Field classes: 8 hours

ECTS credits

1
ECTS cradits - 1 ECTS
Field work - 8 h
Consultations - 4 h
Student's own work - 8 h
TOTAL - 20 h

The academic cycle

2023/2024 winter semester

Type of course

obligatory

Language of instruction

English

Teaching methods

- conducting experiments
- group work

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

perform experiment and present a report

The basic criteria for evaluation

The quality of work done by the student before and during the cruise as well as the content of the report will be assessed.
Students must obtain at least a satisfactory grade for every assessed learning outcome.

Method of verifying required learning outcomes

Learning outcomes	Group work	Experimental work
	Knowledge	
KW_01	Report	
	Skills	
KU_01	Performance during research crusie	
	Competences	
KK_03		Performance during research cruise

Required courses and introductory requirements

A. Formal requirements
B. Prerequisites

Aims of education

- Acquisition by students of knowledge about the marine resources (KW_01)

- Acquisition the ability to plan and perform field studies, especially marine sample collection and preservation (KU_01)
- Acquisition by student the ability to carry out experiments at sea according to safety regulations (KK_03)

Course contents

Organisation of the research cruise, sampling, preservation of biological material, sample analysis.

Bibliography of literature

Manuals of instruments and other equipment used on board the research vessels

The learning outcomes (for the field of study and specialization)

KW_01
KU_01
KK_03

Knowledge

KW_01 Student possesses knowledge on the diversity of marine resources

Skills

KU_01 Student possess the ability to use instruments and equipment used on research vessel for sampling and measurements

Social competence

KK_03 - Student has an ability to work on board the research vessel in line with safety regulations

Contact

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