



WNoŻiR



Field of study	Aquaculture and Fisheries					
Mode of study	stationary	Level	first cycle			
Graduate's qualification	inżynier					
Fields of science	agricultural sciences					
Disciplines of science	animal science and fisheries (100%)					
Educational profile	general academic					
Module						
Course unit	Techniques of molecular biology					
Code	WNOZIR/AQF/S1/					
Field of specialisation						
Administering faculty	Department of Meat Technology					
ECTS	5.0	ECTS (forms)	5.0			
Form of course credit	examination	Language	english			
Electives			Elective group			
Form of instruction	Cod	Semester	Hours	ECTS	Weight	Credit
laboratory course	L	6	30	2.0	0.50	credits
lecture	W	6	30	3.0	0.50	examination
Leading teacher	Panicz Remigiusz (rpanicz@zut.edu.pl)					
Other teachers						

Prerequisites	
W-1	Class in genetics and biology is recommended
W-2	Students should have completed biology course. Mathematics can also be helpful to candidates in completing this course.

Module/course unit objectives	
C-1	To provide students with a fundamental understanding of genetic principles underlying the application of molecular genetic techniques.
C-2	This course is an introduction to the fundamental principles of molecular biology techniques. Students will be introduced to the study of genetics, proteins, nucleic acids and interpret primary data from current research.

Course content divided into various forms of instruction		Number of hours
T-L-1	Safety, basic techniques, pipetting, sterile technique	2
T-L-2	Sampling techniques and data collection	2
T-L-3	Purification and characterisation of DNA	3
T-L-4	Purification and characterisation of RNA	3
T-L-5	Electrophoresis	2
T-L-6	Plan and run Polymerase Chain Reactions	3
T-L-7	Nested PCR	2
T-L-8	Extracting bands from multiplex PCR gel	2
T-L-9	DNA restriction	2
T-L-10	Absolute and relative quantification by real-time PCR	4
T-L-11	Gene finding, BLAST searching	2
T-L-12	Sequence data analysis	3
T-W-1	Introduction and course syllabus. Nature of molecular biology. Genetic terminology.	3
T-W-2	DNA as the genetic material. RNA processing. Protein structure review.	4
T-W-3	Gene and genome structure.	2
T-W-4	Nucleic acid isolation, quantification and analysis.	2
T-W-5	Nucleic acid and protein electrophoresis	2
T-W-6	Polymerase Chain Reaction, and other amplification methods	3
T-W-7	Primer design	2
T-W-8	Real-time PCR	2
T-W-9	Introduction to cloning and sequencing	2
T-W-10	Molecular diagnostics. Markers.	2



Course content divided into various forms of instruction		Number of hours
T-W-11	Basic bioinformatics, sequence databases, sequence retrieval, alignments	2
T-W-12	Overview of different omics techniques	2
T-W-13	Questions and hypotheses of using molecular biology	2

Student workload - forms of activity		Number of hours
A-L-1	Self study	20
A-L-2	Preparation for assessment	10
A-L-3	Laboratory classes	30
A-W-1	Class participation	30
A-W-2	Self-study	40
A-W-3	Preparation for exam	20

Teaching methods / tools	
M-1	Lecture, practical classes and laboratory
M-2	Lecture and laboratory
M-3	Lectures
M-4	Laboratory classes

Evaluation methods (F - progressive, P - final)		
S-1	F	Laboratory exercises and reports
S-2	P	Exam 1 and 2
S-3	F	Continuous assessment (laboratory)
S-4	P	Continuous assessment (laboratory)
S-5	P	Exam

Designed learning outcomes	Reference to the learning outcomes designed for the fields of study	Reference to Learning Outcomes for qualifications at PQF 6, 7 or 8	Reference to learning outcomes for qualifications at level 6 or 7 that enable acquiring engineering competences	Course objectives	Course content	Teaching methods	Evaluation methods
----------------------------	---	--	---	-------------------	----------------	------------------	--------------------

Knowledge								
AQF_1A_C23_W01 Upon completion of this course students will be familiar with: - molecular tools, - bioinformatic (computation) methods, - laboratory workflow, - sampling and sample preservation.	AQF_1A_W01 AQF_1A_W03 AQF_1A_W06	P6S_WG	P6S_WG	C-2	T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7	T-W-8 T-W-9 T-W-10 T-W-11 T-W-12 T-W-13	M-3	S-5

Skills								
AQF_1A_C23_U01 Upon completion of this course the students will be able to: - perform laboratory analyses with molecular tools, - run bioinformatic calculations, - collect and preserve samples, - analyses results from molecular studies.	AQF_1A_U07 AQF_1A_U14	P6S_UW		C-2	T-L-1 T-L-2 T-L-3 T-L-4 T-L-5 T-L-6	T-L-7 T-L-8 T-L-9 T-L-10 T-L-11 T-L-12	M-4	S-3

Social competences								
AQF_1A_C23_K01 Student will be aware to continually improve knowledge and skills.	AQF_1A_K01 AQF_1A_K03 AQF_1A_K05	P6S_KK P6S_KO P6S_KR		C-2	T-L-1 T-L-2 T-L-3 T-L-4 T-L-5 T-L-6 T-L-7 T-L-8 T-L-9 T-L-10 T-L-11 T-L-12 T-W-1	T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-8 T-W-9 T-W-10 T-W-11 T-W-12 T-W-13	M-3	S-3

Outcomes	Grade	Evaluation criterion
Knowledge		
AQF_1A_C23_W01	2,0	
	3,0	Student is be able characterize the most common molecular tools
	3,5	
	4,0	
	4,5	
	5,0	



Skills

AQF_1A_C23_U01	2,0	
	3,0	Student is able to choose, prepare and applicate the proper molecular experiments
	3,5	
	4,0	
	4,5	
	5,0	

Other social competences

AQF_1A_C23_K01	2,0	
	3,0	Student understands at the basic level the need for continuous training and development in the field of molecular biology
	3,5	
	4,0	
	4,5	
	5,0	

Required reading

1. Sambrook J., Russel D.W., Molecular cloning, a laboratory manual, Cold spring harbor laboratory press, Cold spring harbor, 2001, III
2. Green M.R., Sambrook J., Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Laboratory Press, 2012, 4th edition
3. Green M.R., Sambrook J., Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Laboratory Press, 2012, 4th edition
4. Ausubel F.M. et al., Current protocols in molecular biology, John Willey & Sons, 2003