HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF AQUACULTURE AND
ENVIRONMENTAL SAFETY

Address: Szent István Campus, 2100 Gödöllő, Páter Károly u. 1.

COURSE CATALOGUE for Exchange students

2026/27 Academic year

The **Institute of Aquaculture and Environmental Safety of MATE at Szent István Campus** is currently offering the following core courses for the 2026/27 academic year. **Additional courses will be announced before the start of the semester, providing a wider range of courses to choose from.**

Exchange students are integrated with full degree international students during the semesters' workflow in the following study programmes:

- **MSc in Aquaculture / Fish Farming Engineering**

Also some subjects from the following study programmes:

- **BSc in Agricultural Engineering**
- **MSc in Wildlife Management Engineering**
- **BSc in Environmental Engineering**

Exchange students can take both bachelor's and master's subjects regardless of their study level or semester; however, timetable conflicts may occur.

2026/27 Autumn semester

Lectures: from early September to mid December.
Exams: mid December to late January.

2026/27 Spring semester

Lectures: from early February to mid May.

Exams: mid May to late June.

2026/27 Autumn semester

STUDY PROGRAMMES	SUBJECT CODE	SUBJECT NAME	ECTS Credits	*relevant semester of the study program at MATE*
BSc in Agricultural Engineering	AKVKB063N	Freshwater Fisheries	4	*5*
BSc in Environmental Engineering	AKVKB042N	Environmental Hygiene	3	*7*
MSc in Fish Farming Engineering	AKVKB007N	Master Thesis Writing: Research and Publication Methodology	5	*1*
MSc in Fish Farming Engineering	AKVKB011N	Protection of Surface Waters	4	*1*
MSc in Fish Farming Engineering	AKVKB253N	Reproductive Physiology of Fish	2	*1*

2026/27 Spring semester

STUDY PROGRAMMES	SUBJECT CODE	SUBJECT NAME	ECTS Credits	*relevant semester of the study program at MATE*
MSc in Aquaculture	AKVKB260N	Fish Nutrition	3	2
MSc in Fish Farming Engineering	AKVKB258N	Fish Farming Technology	3	2
MSc in Fish Farming Engineering	AKVKB025N	Fish Propagation and Fry Rearing	2	2
MSc in Fish Farming Engineering	AKVKB261N	Pond and Intensive Fish Farming	3	2
MSc in Wildlife Management Engineering	AKVKB051N	Wildlife molecular ecology	3	4

Freshwater Fisheries

Study Programme: BSc in Agricultural Engineering

SEMESTER: 2026/27/1

Relevant semester of the Study Programme at MATE: 5

SUBJECT CODE: AKVKB063N

ECTS Credits: 4

AIM OF SUBJECT:
The objective of this course is to impart an understanding of the principles of fish farming and aquaculture, encompassing the operations of a fish farm. Students will acquire knowledge regarding the primary cultivated fish species, the sequential processes of fish farming, the diverse types of fish farms categorized based on their construction and functionality, and gain an appreciation for the challenges encountered in the fish farming industry.

CONTENT:
1. Introduction. Interpretation of concepts and technical terms related to the subject.

2. Technical conditions for lake fish farming. Site selection. Licensing procedure. Water rights issues. Planning and implementation.

3. Types of fish ponds according to their construction. Technical differences between circular and valley dam fish ponds. Structures and their construction.

4. Water supply for fish ponds. Water management, water quality. Water supply and replacement requirements. Water fees and water resources. Administrative tasks (reporting obligations, water resource allocation, etc.)

5. Types of fish farms according to their size and production profile. Full-time and part-time farms. Presentation of fish farms according to ownership. Background and current situation. Types of fish ponds according to their size and production function.

6. Production characteristics of fish species farmed in pond farms I. Overview of non-predatory fish species

7. Production characteristics of fish species farmed in pond farms II. Predatory fish species.

9. Production characteristics of invasive exotic fish species in pond farms III.

10. Protected fish species in pond farms

11. Other fish species found in fish farms

12. The economics and profitability of fish production. Most important cost types. Farm size and profitability

13. Alternative sources of income in fish farms. Fishing tourism, ecotourism. The fisheries sector support system. Extensive fish farming target program.

GRADING SYSTEM:

Assessment takes the form of a practical test, which students complete in the university's e-learning system. The assessment system is as follows:

0-50%: Unsatisfactory (1)

51-60%: Satisfactory (2)

61-70%: Average (3)

71-85%: Good (4)

86-100%: Excellent (5)

LITERATURE:

László Horváth, Gizella Tamás, Chris Seagrave, 2002. Carp and Pond Fish Culture, Second Edition. Print ISBN:9780852382820

Environmental Hygiene

Study Programme: BSc in Environmental Engineering

SEMESTER: 2026/27/1

Relevant semester of the Study Programme at MATE: 7

SUBJECT CODE: AKVKB042N

ECTS Credits: 3

AIM OF SUBJECT:
The expected outcome of this course is the basic knowledge of terms and definitions used in environmental hygiene, the understanding of the legal and historical background and based on the overview of the theoretical, practical aspects and case studies of environmental hygiene, the ability to prevent, monitor and manage health problems originating from the environment.

CONTENT:
heory - lectures

The course covers basic knowledge of hygiene and sanitation with a special focus on environmental hygiene. Students will get an overview of the role of hygiene in human history, the theoretical, legal, institutional, and practical background of hygiene and sanitation (at national and international level). Environmental hygiene including air, water (drinking water, recreational water, irrigation water, sewage), soil, food, waste hygiene and radiation with their relevant legal background and measurement techniques will be all discussed.

Practical learning

Besides the case studies that are discussed as seminar practices, the practical learning will be performed as a laboratory practice. After the basic labor safety education of the students, the basic techniques for environmental sampling and the determination of microbial, chemical and ecotoxicological parameters of environmental samples will be demonstrated and performed. Practical sessions will cover the administration, documentation and evaluation of laboratory measurements and the interpretation of data.

GRADING SYSTEM:
Requirements: Attendance at lectures and practical sessions (checked by the lecturer).

Conditions for acceptance (signature):

Participation in the practical sessions (mandatory).

Exam: Written exam or e-learning test in the exam period 06. November 2024. November 4-23).

Evaluation of test results (60 points):

52-60 points Excellent (5)

46-51 points Good (4)

37-45 points Satisfactory (3)

31-36 points Acceptable (2)

0-30 points Fail/Insufficient (1)

1.Student who does not achieve the acceptable score (2) may take a supplementary exam at the announced dates.

LITERATURE:

1.The compulsory curriculum is the material of lectures and practice (regularly uploaded to the e-learning system).

Master Thesis Writing: Research and Publication Methodology

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/1

Relevant semester of the Study Programme at MATE: 1

SUBJECT CODE: AKVKB007N

ECTS Credits: 5

AIM OF SUBJECT:
The aim of the course is to introduce students to research methodology and scientific communication. In this course, students will learn how to formulate a scientific hypothesis, how to test a hypothesis and how to conduct statistical analysis. In addition, emphasis will be placed on developing skills in scientific communication, the correct use of scientific language, and the preparation of scientific papers and presentations.

CONTENT:
1. Aim of scientific research, history of experimental design, principles of experimental design, questions to ask. General design of experiments, independent samples, replication.

2. General rules of sampling, sampling from water, sediment, living organisms, invasive and non-invasive sampling. Design of experiments in aquatic organisms.

3. Design of toxicological and climate change experiments.

4. Biometrical and statistical tests used to evaluate the results of life science and ecotoxicology experiments.

5. History, aims and theoretical basis of scientific communication. Types of scientific publications, books, journal articles, scientific papers, lectures, posters, etc.

6. Structure and content of scientific publications. General rules of writing, thesis, chapter, section, paragraph, sentence.

7. Processing of literature, introduction to literature sorting software.

8. Correct use of scientific text. Scientific presentation and poster preparation. Preparing a scientific and professional CV.

GRADING SYSTEM:

The assessment is in the form of an exam test, which students complete in the university's elearning system. Assessment system:

0-50 points: unsatisfactory (1),

51-60 points: satisfactory (2),

61-70 points: intermediate (3),

71-84 points: good (4),

85-100 points: excellent (5)

LITERATURE:

Updated and updated teaching materials distributed in lessons and exercises

Protection of Surface Waters

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/1

Relevant semester of the Study Programme at MATE: 1

SUBJECT CODE: AKVKB011N

ECTS Credits: 4

AIM OF SUBJECT:
The education aims to provide an overview of the protection and utilization of surface waters, with particular attention to water management, the pressures on surface waters, and the Water Framework Directive.

CONTENT:
Introduction. Curriculum and practical information about the course. Individual tasks' assignment.

Fundamentals of environmental protection.

Water as a strategic environmental element.

Surface water load and pollution. Introduction to the major water pollutants (organic, inorganic) and their sources.

Water resource management, water balance, data sources.

Legal regulations related to the protection of surface waters.

Principles, laws, monitoring and sanctions.Surface water sampling, on-site measurement techniques, and laboratory techniques.

Requirements for the quality of surface waters, drinking water and irrigation water.

Water hygiene and epidemics. Antimicrobial resistance.

Institute of Aquaculture and Environ. Safety. Microbial and ecotoxicological analysis of surface water samples.

EU Water Framework Directive. Objectives and examples for the national implementation.

Water resource engineering.

Hazardous activities and their consequences on surface waters (waste management, microplatics, etc.)

Wastewater treatment. Rules for the discharge of used water and wastewater.

Presentation of individual student assignments.

GRADING SYSTEM:

1. Attendance at lectures is recommended, and at practices is mandatory. Attendance is checked by the lecturer by keeping a catalogue. Absences must be justified.

2. The curriculum is the material presented at lectures and practices, and all written materials that are occasionally shared during classes or through e-learning.

3. The condition for the recognition of the semester by signature is regular attendance at lectures and practices, justification (e.g., with a medical certificate) of any absences, and successful delivery of independent tasks (presentations with 20-30 minutes duration) - at least at an average (grade 3) level.

4. A written exam must be taken during the exam period, in which the examinee must account for his/her knowledge of the curriculum specified under point 2.

5. Evaluation of test results (60 points):

52-60 points Excellent (5)

46-51 points Good (4)

37-45 points Satisfactory (3)

31-36 points Acceptable (2)

0-30 points Fail/Insufficient (1)

LITERATURE:

The material presented at lectures and practices, and all written materials that are occasionally shared during classes or through e-learning.

Agnes Chong (2022): International Law for Freshwater Protection. In International Water Law Series, Vol 9. Brill Nijhoff , Leiden/Boston, 404 p , ISBN: 978- 90- 04- 51182- 8. ISBN 978- 90- 04- 51183- 5 (e- book)

WWF, We can meet the freshwater needs of people and nature. Explore Freshwater Environments, https://www.wwf.org.uk/what-we-do/protecting-our-rivers-lakes-and-freshwater

Barreto et al. (2017): Water in Hungary. Status overview for the National Water Programme of the Hungarian Academy of Sciences.

https://mta.hu/data/dokumentumok/Viztudomanyi%20Program/Water_in_Hungary_2017_07_20.pdf

Buffa-Dörr et al. (2017): Overview of the Hungarian Water Hygiene Situation. https://www.nnk.gov.hu/cejoem/Volume23/Vol23No1-2/23_1-2_Article_05.pdf

Willian C. Lipps (2022): Standard Methods for the Examination of Water and Wastewater, 24th Edition. American Water Works Association, 1516 p, ISBN 9780875532998

Spellman Frank R. (2022): The Science of Water: Concepts and Applications. Crc Pr Inc, 612 p, ISBN 9780367555887

Reproductive Physiology of Fish

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/1

Relevant semester of the Study Programme at MATE: 1

SUBJECT CODE: AKVKB253N

ECTS Credits: 2

AIM OF SUBJECT:
This introductory course provides students with a fundamental understanding of the reproductive biology of teleost fishes, including their gonads and their physiological functions. The course serves as a prerequisite for acquiring knowledge of fish reproduction and fry rearing, while simultaneously delving into the major neuroendocrine and genetic processes that underpin reproduction and propagation. It enhances students' comprehension of the development, ultrastructure, and physiological functions of fish gametes.

CONTENT:
General patterns of fish reproduction.

Development and morphology of the testis.

Spermatogenesis, perm morphology and physiology.

Development and morphology of the ovary.

Oogenesis, oocyte morphology and physiology.

Egg morphology and physiology.

Fertilization of fish egg.

Fish embryogenesis, hatching and larval development.

Neuroendocrine and environmental regulation of fish reproduction.

GRADING SYSTEM:
Requirements:

1. Attendance at lectures and practical seminars is mandatory and subject to random checks by the lecturer.

2. The teaching material consists of lectures and exercises and written teaching aids distributed occasionally.

3. Attendance of seminars is a condition of acceptance for the semester. Seminars cannot be substituted. Students who do not meet this condition will not receive a semester acceptance signature.

4. Students will take a written examination at the end of the semester for which they will receive a maximum of 100 points. The marks are graded according to the number of points: 0-50 points: unsatisfactory (1), 51-60 points: satisfactory (2), 61-70 points: intermediate (3), 71-84 points: good (4), 85-100 points: excellent (5).

LITERATURE:

Class presentations, notes and occasional handouts.

Robert J. Wootton, Carl Smith, 2014. Reproductive Biology of Teleost Fishes. ISBN:9780632054268; 2015 John Wiley & Sons, Ltd

László Horváth, Gizella Tamás, Chris Seagrave, 2002. Carp and Pond Fish Culture, Second Edition. Print ISBN:9780852382820

Fish Nutrition

Study Programme: MSc in Aquaculture

SEMESTER: 2026/27/2

Relevant semester of the Study Programme at MATE: 2

SUBJECT CODE: AKVKB260N

ECTS Credits: 3

AIM OF SUBJECT:
The aim of the course is to introduce students to the physiology of fish digestion and the fundamentals of fish nutrition. Students will learn the technology of feeding fish under both intensive production and pond farming conditions. They will become familiar with the main characteristics of fish feed production and storage. Within the framework of the course, the feeding of carp, African catfish, percid fish, salmonids, and sturgeon species will be presented in detail.

CONTENT:
·Physiology of fish nutrition I

·Physiology of fish nutrition II

·The role of proteins in fish nutrition

·The role of fats in fish nutrition

·Carbohydrates, minerals and vitamins in fish nutrition

·Cereals and legumes in fish nutrition — Midterm test I.

·Pre-, pro-, and symbiotic substances, and the role of the microbiome in fish nutrition

·Production and storage of complex fish feeds

·Technology of feed application

·Feeding of carp

·Feeding of African catfish

·Feeding of salmonids

·Feeding of percid and sturgeon species Test II.

GRADING SYSTEM:

Attendance at lectures and practical classes is mandatory and will be checked randomly by the instructor. To receive a grade for the course, students must complete two midterm tests during the semester. The evaluation of their results follows the Study and Examination Regulations.

LITERATURE:

Woynárovich, András & Kovács, Éva & Peteri, Andras & Mezes, Miklos. (2023). FIELD GUIDE TO FEEDING FISH IN CENTRAL AND EASTERN EUROPE, THE CAUCASUS AND CENTRAL ASIA.

Fish Farming Technology

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/2

Relevant semester of the Study Programme at MATE: 2

SUBJECT CODE: AKVKB258N

ECTS Credits: 3

AIM OF SUBJECT:
The purpose of the course is to familiarize students with pond-based fish farming methods and technologies. Students will acquire practical knowledge of the most important technological elements related to these practices and gain insight into other activities associated with pond aquaculture (recreational fisheries management, nature conservation).

CONTENT:
·Fundamentals and terminology of pond aquaculture technologies

·Infrastructure and equipment required for pond fisheries management

·Basics of water management in fish ponds (water quality, water demand, water regulation)

·Organic matter production and decomposition in fish ponds; the importance and methods of organic fertilization

·Other yield-enhancing methods

·Technologies for the production of juvenile and market-size fish in ponds

·Stocking structures and major fish species; yield calculations

·The importance of predatory fish and interactions between predatory fish and forage fish

·Possibilities for intensification in pond aquaculture

·Practical aspects of harvesting, fish handling, and fish transport

·Multifunctional fisheries management

·Fisheries management for angling purposes

·Conflict situations between fisheries management and nature conservation

GRADING SYSTEM:

Attendance at lectures and practical classes is mandatory and will be checked randomly by the instructor. During the examination period, students must take a written exam and will receive a grade according to the Study and Examination Regulations.

LITERATURE:

Horváth, L., Tamás, G., Coche, A.G., Kovács, E., Moth-Poulsen, T. & Woynarovich, A. 2015. Training manual on the artificial propagation of carps. A handout for on-farm training workshops on artificial propagation of common carp and Chinese major carps in Central and Eastern Europe, the Caucasus and Central Asia. Second revised edition. Budapest, FAO REU. 31 pp.

Fish Propagation and Fry Rearing

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/2

Relevant semester of the Study Programme at MATE: 2

SUBJECT CODE: AKVKB025N

ECTS Credits: 2

AIM OF SUBJECT:
The demand for fish for food is steadily increasing. This has resulted in an increased effort in the development of techniques for hatchery production of fish. A number of fish species that have great economic significance for aquaculture do not reproduce spontaneously in captivity. Hormone-induced spawning is the only reliable method to induce reproduction. By the application of this technology, a great quantity of fish feeding larvae can be produced.

To achieve better results, larvae should be raised to a larger sizes. A very reliable pond technology has been developed on the rearing of fish larvae. This technology is based on a sustainable exploitation of aquatic resources and is based on the biological cycles and processes of pond life with a focus on the structure and development of zooplankton. Larvae of other species like Salmonids, Acipenserids and African catfish can only be reared successfuly in intensive systems.

CONTENT:
1. The history of fish breeding. Classification of fish propagation methods

2. Hatchery propagation: selection of broodfish candidates, rearing and feeding of broodstock

3. Hatchery propagation of common carp 1.: hormonal treatment, stripping, artificial insemination

4. Hatchery propagation of common carp 2.: egg incubation, hatching, hatchery larval rearing

5. Propagation of herbivorous fish species

6. Propagation of predatory fish species

7. Methods of rearin fingerlings of Cyprinids: one- and two-phase rearing of fingerlings

8. Technology of pond rearing: advanced-rearing of common carp and herbivorous fish fries

9. Advanced-rearing of fry of predatory fish species in ponds and in intensive environments

10. Breeding and larval rearing of African catfish

11. Pond rearing of fingerlings of Cyprinid species 1.: pond preparation, rasks in the autumn and the spring

12. Pond rearing of fingerlings of Cyprinid species 2.: stocking, feeding, sample fishing, harvesting

13. Transport of fingerlings, wintering of fingerlings

GRADING SYSTEM:
Requirements:

1. Attendance at lectures and practical seminars is mandatory and subject to random checks by the lecturer.

2. The teaching material consists of lectures and exercises and written teaching aids distributed occasionally.

3. Attendance of seminars is a condition of acceptance for the semester. Seminars cannot be substituted. Students who do not meet this condition will not receive a semester acceptance signature.

4. Students will take a written examination at the end of the semester for which they will receive a maximum of 100 points. The marks are graded according to the number of points: 0-50 points: unsatisfactory (1), 51-60 points: satisfactory (2), 61-70 points: intermediate (3), 71-84 points: good (4), 85-100 points: excellent (5).

LITERATURE:

Class presentations, notes and occasional handouts.

László Horváth, Gizella Tamás, Chris Seagrave, 2002. Carp and Pond Fish Culture, Second Edition. Print ISBN:9780852382820; DOI:10.1002/9780470995662

Woynárovich, E. and Horváth, L., 1980. The artificial propagation of warm-water fin fishes - a manual for extension. FAO Fish. Tech. Paper, 201 pp

Pond and Intensive Fish Farming

Study Programme: MSc in Fish Farming Engineering

SEMESTER: 2026/27/2

Relevant semester of the Study Programme at MATE: 2

SUBJECT CODE: AKVKB261N

ECTS Credits: 3

AIM OF SUBJECT:
The objective of the course is to provide students with the knowledge and understanding of fish production technologies applied in pond-based and intensive aquaculture systems. The course covers the structural and functional principles of key production methods, including intensive pond culture, cage systems, flow-through, and recirculating aquaculture systems (RAS). Students will also gain insight into the biological and technological requirements of the principal fish species cultivated within these systems.

CONTENT:
1.General information about intensive aquaculture

2.Water management in intensive system

3.Infrastructure of intensive system in overview

4.Types of intensive system (RAS, raceway , cage, intensive pond fish culture)

5.Equipments in intensive system

6.Main fish species in intensive system: Trouts

7.Main fish species in intensive system: Tilapia

8.Main fish species in intensive system: Salmon

9.Main fish species in intensive system: Sturgeons

10.Main fish species in intensive system: Catfish

11.Main fish species in intensive system: Sea bass and sea bream

12.Other fish species cultured in intensive system

13.Written test

GRADING SYSTEM:

Attendance at lectures and practical seminars is mandatory and subject to random checks by the lecturer. For course assessment, students are required to complete an midterm exam during the semester, the results of which are evaluated in accordance with the Academic and Examination Regulations.

LITERATURE:

1.Class presentations, notes and occasional handouts.

2.Timmons, Michael & Guerdat, Todd & Vinci, Brian. (2018). Recirculating Aquaculture, 4th edition.

Wildlife molecular ecology

Study Programme: MSc in Wildlife Management Engineering

SEMESTER: 2026/27/2

Relevant semester of the Study Programme at MATE: 4

SUBJECT CODE: AKVKB051N

ECTS Credits: 3

AIM OF SUBJECT:
The primary objective of this course is to impart knowledge and comprehension of wildlife management and genetic diversity in wild vertebrates. Beyond the foundational principles of genetics, the course delves into evolutionary trends, the development of molecular biology methodologies, and their practical applications. Additionally, it elucidates the principles of endelian inheritance in real-world scenarios. In the context of population genetics, the course facilitates the understanding of the Hardy-Weinberg equilibrium and its operational principles through practical examples.

CONTENT:
Genetics Fundamentals

Methods:

- Cytogenetics

- Chromosome evolution

- Genetic markers

- Protein polymorphisms

- Molecular genetics

- Polymerase chain reaction (PCR)

- Microsatellites

- Genome sequencing

Mendelian Genetics:

- Mendelian principles

- Deviations from Mendelian principles

- Inheritance patterns

- Inherited traits

Population Genetics:

- Hardy-Weinberg equilibrium

- Genotype and allele frequencies

- Allele diversity

Population Vulnerabilities:

- Inbreeding

- Hybridization

- Introgression

GRADING SYSTEM:

The assessment is in the form of an exam test, which students complete in the university's elearning system. Assessment system:

0-50%: Unsatisfactory (1)

51-60%: Fair (2)

61-70%: Average (3)

71-85%: Good (4)

86-100%: Excellent (5)

LITERATURE:

Notes and handouts of lectures.