Sveučilište u Zagrebu Agronomski fakultet
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New technologies in aquaculture (296556)

Nositelj kolegija

prof. dr. sc. Ana Gavrilović

Opis kolegija

The aim of the course is to acquaint students with the development of aquaculture technology through the introduction of new techniques, methods and innovative technological solutions. Innovative approaches to the design, engineering and construction of breeding systems and their components will be presented and explained through the improvement of control and monitoring of the quality of the breeding environment, the introduction of new species for breeding and the improvement of the genetic material of the existing ones, the improvement of the living conditions and the health status of the cultivated organisms, the improvement of the feed characteristics, treatment of wastewater and other waste materials (by-products), sustainable management of solid waste from primary production and processing processes. The identification of the need for new technologies that improve the efficiency and profitability of certain production processes and those that follow new legal regulations, the need for the sustainability of production processes and the need to create a safe and healthy product will be explained.

ECTS: **6.00**

Sati nastave: 60
Predavanja: 30
Laboratorijske vježbe: 10
Seminar: 8
Terenske vježbe: 12

Izvođač predavanja

- prof. dr. sc. Ana Gavrilović
- prof. dr. sc. Marina Piria
- prof. dr. sc. Tea Tomljanović
- prof. dr. sc. Daniel Matulić

Izvođač vježbi

- dr. sc. Ivan Špelić
- dr. sc. Tena Radočaj

Ocjenjivanje

Dovoljan (2):
Dobar (3):
Vrlo dobar (4):
Izvrstan (5):

Opis

Written tests, oral exam, seminar and activity.

Vrsta kolegija

- Graduate studies / MS Courses taught in English (Izborni kolegij, 1. semestar, 1. godina)

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Opće kompetencije

Basic knowledge on aquaculture

Oblici nastave

- Lectures
- Laboratory practice/exercises
- Field work
- Seminars
- Exercises

Ishodi učenja i način provjere

Ishod učenja	Način provjere
To identify the natural production features of aquaculture in different ecological conditions	
Analyze specific problems of cost-effective and environmentally acceptable cultivation of aquatic and terrestrial organisms and solve them in new situations based on the synthesis of acquired knowledge and skills	
To use the acquired abilities of theoretical and practical learning in the acquisition of new knowledge in aquaculture	
Independently organize and lead jobs in institutions in the field of aquaculture, in the work in the advisory services and in the management of services in local government bodies in this domain	
Independently design an adequate system in aquaculture for the purpose of growing different aquatic organisms, organize and manage operations in production	
Organize and lead the work of a professional associate in state administration bodies, scientific-educational and research institutions and for the performance of classes in vocational secondary and higher schools in this domain	
To recognize important events in own domain of education and to present them in the media and journalism	
Set up research in your field, conduct field and laboratory work, study relevant literature, statistically process data, and write and submit a paper for publication in a professional journal	
Use information and communication technology in everyday work	

Način rada

Obveze studenta

Attendance of the lectures and exercises.
Execution of work tasks.
Preparation and defense of seminar work.
Written knowledge tests.
Passing an oral exam.

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Tjedni plan nastave

1. Introduction - Overview of the development of aquaculture technology through the introduction of new techniques and methods (concrete examples of technology development in certain branches of aquaculture)
2. Design and construction of innovative systems - Closed recirculation systems, coupled and un-coupled aquaponics, "zero-exchange" systems, combined production systems, biogas production in synergy with aquaculture
3. Application of innovative methods and technology in the disposal and utilization of solid waste and dead fish from fish farms and by-products and waste from the fish processing process - Row materials in the production of cosmetic and pharmaceutical products, production of fish meal and oil, composting and silage
4. The use of new/innovated equipment - Examples of development and introduction of new equipment in aquaculture farming systems
5. Introduction of new species for cultivation and development of their cultivation technology - Ecology of the species; Development of the farming technologies for the introduction of new species according to their ecological requirements; examples on different species of fish, bivalve and prawns
6. Development of methods and equipment for monitoring and quality control of the breeding environment - Examples of manual control and development of sophisticated computer control of breeding systems and production processes
7. Application of new genetic methods in aquaculture - Molecular techniques, triploids, tetraploids, etc.
8. Use of ozone in aquaculture - Different examples of ozone application
9. Preventive methods to increase biosecurity - Biosecurity plans, four levels of measures will be explained, vaccination, use of probiotics, etc.
10. Improvement of the living conditions and health status of cultivated organisms by introducing new technologies - Practical examples will be given
11. New technologies and methods for improving the feed characteristics for farmed animals
12. The need to develop new methods and technologies in response to new legal regulations and requirements for sustainable aquaculture.

Obvezna literatura

1. Van Gorder, S. D. 2000. Small Scale Aquaculture. Alternative Aquaculture Assn. Breiningsville, USA. Pp. 190.
2. Browdy, C.L., Hulata, G., Liu, Z., Allan, G.L., Sommerville, C., Passos de Andrade, T., Pereira, R., Yarish, C., Shpigel, M., Chopin, T., Robinson, S., Avnimelech, Y. & Lovatelli, A. 2012. Novel and emerging technologies: can they contribute to improving aquaculture sustainability? In R.P. Subasinghe, J.R. Arthur, D.M. Bartley, S.S. De Silva, M. Halwart, N. Hishamunda, C.V. Mohan & P. Sorgeloos, eds. Farming the Waters for People and Food. Proceedings of the Global Conference on Aquaculture 2010, Phuket, Thailand. 22–25 September 2010. pp. 149–191. FAO, Rome and NACA, Bangkok.
3. Arvanitoyannis I.S.,Kassaveti A. (2008), Fish industry waste: treatments, environmental impacts, current and potential uses, International Journal of Food Science and Technology, 43: 726–745.
4. D. Yuvaraj, B. Bharathiraja, J. Rithika, S. Dhanasree, V. Ezhilarasi, A. Lavanya & R. Praveenkumar (2016) Production of biofuels from fish wastes: an overview, Biofuels, DOI: 10.1080/17597269.2016.1231951

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Preporučena literatura

1. Yeo, S.E., Binkowski, F. P., Morris, J.E. 2004. Effluents and Waste By-Products Characteristics, Potential Recovery, and Beneficial Reuse. North Central Regional Aquaculture Center, USA. pp 63
2. Timmons, M.B., Losordo, T.M. 1994. Aquaculture Water Reuse Systems: Engineering, Design and Management. Elsevier, Amsterdam. pp. 333.
3. Timmons, M.B., J.M. Ebeling, F.W. Wheaton, S.T. Summerfelt & B.J. Vinci. 2001. Recirculating Aquaculture Systems. Cayuga Aqua Ventures. Ithaca, New York, N.Y. pp 647.

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