University of Zagreb Faculty of Agriculture
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Invertebrates breeding (296616)

Course coordinator

Prof. Tea Tomljanović, PhD

Course description

Learning about cultivation of useful invertebrates as a direct food (shells, snails, cephalopods, crabs, sea urchins) or as organisms whose body or physical activity is important in the production of honey, silk, humus (bees, silkworm, earthworms). An overview of the current breeding status of invertebrates and potential interaction with other industries. Systematic determination of important organisms for beeding with basic biological and ecological factors on which the technology of breeding is based. The basic structure of the breeding site with all the particularities important for each invertebrate species. Learning about of all categories if invertebatates up to the final stage of breeding.

ECTS: **6.00**

Teaching hours: 60
Lectures: 32
Laboratory exercises: 10
Seminar: 8
Field exercises: 10

Associate teacher for exercises

- Prof. Dragan Bubalo, PhD
- Prof. Ana Gavrilović, PhD
- Prof. Daniel Matulić, PhD
- Assoc. Prof. Lidija Svečnjak, PhD
- Assoc. Prof. Saša Prđun, PhD

Grading

Sufficient (2): 66-75%
Good (3): 76-85%
Very good (4): 86-93%
Excellent (5): 94-100%

Description

During the semester, three written tests are organized with questions from the previously presented material. Prerequisites for passing a final exam are participation in classes (lectures, field trips and seminars), writing of written seminar and successful solving of written tests.

Type of course

- Undergraduate studies / BS Courses taught in English (Elective course, 2 semester, 1 year)

General competencies

Student acquires basic theoretical and practical knowledge of the different invertebrate species. Student acquires technological production methods of different breeding stages of certain species, both water and terrestrial invertebrates. Students are trained for independent planning and production of invertebrate breeding. They are motivated for further education through the modules of Aquaculture or Apiculture, at graduate studies.

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Types of instruction

- Lectures
- Field work
- Seminars

  Students independently work on seminars, firstly by choosing titles from the offered themes, then create and present seminar work.
- Exercises

Learning outcomes

Learning outcome	Evaluation methods
Identify the positions and trends of breeding invertebrates and apply acquired knowledge in the process of their production.	Written exam, oral exam, seminar
Technological processes of production of different breeding stages of certain invertebrates.	Written exam, oral exam, seminar
Identify important occurrence in the cultivation of invertebrates and present them in the media and publicity.	Written exam, oral exam
Accomplish field and laboratory work, study relevant literature, process data, and write seminar paper.	Written exam, oral exam, seminar

Weekly class schedule

1. Definition of invertebrates breeding and purpose of breeding. Overview of breeding invertebrates.
2. Invertebrate taxonomy - Taxonomic overview of invertebrates breeding species with basic organic system examination.
3. Earthworm - Biology and ecology of the earthworm; Understanding the morphological and anatomical characteristics.
4. Lumbrick culture - Methods of determination of basic physical and chemical indicators of habitat.
5. Echinodermata - Biology and Ecology of Echinodermata; section, morphological measurements.
6. Sea urchin - Breeding of sea urchin; Measurement and determination of the gonad structure; Selection of seminar topic according to agreement with each student and selection of literature.
7. Shellfish - Biology and ecology of shellfish and various breeding technologies; Growth Methods; written exam. Growing oysters, mussels; Understanding morphological and anatomical characteristics of oysters and mussels.
8. Silkworm - Biology and ecology of silkworm (Bombyx mori) and various breeding technologies; Growth Methods.
9. Environment of the farms - Mutual influence of fish farms and environment, Physical chemical indicators of growing medium.
10. Heliculture - Biology and ecology of snails, heliculture; Selection of seminar topic and literature selection.
11. Bumblebee - Breeding bumblebee, Overview of lifeline habits ; written exam (II).
12. Solitary bees - Breeding solitary bees; Overview of lifeline habits.
13. Decapod crabs - Biology and ecology of decapod crabs important for breeding (shrimp) and potentially interesting (lobster and hay); Crabs section, Growing of Artemia salina and other plankton species as fish larvae primary food.
14. Cephalopods - Breeding of cephalopods; most common diseases of cultivated invertebrates.
15. Seminar presentation - Written exam, Seminar presentation.

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Obligatory literature

1. Presentations and materials from the professors.
2. Spencer, B. E. (2000.): Molluscan Shellfish Farming. Blackwell Publishing, pp 274.
3. Jewel Md. Abu Sayed, Abdullah Al Masud, Ruhul Amin, Md. Ayenuddin Haque and Nazia Sultana (2016): Comparative growth of Tubificid worms in culture media supplemented with different nutrients. International Journal of Fisheries and Aquatic Studies; 4(6): 83-87.
4. Gervis, M.H., Sims, N.A. (1992): The Biology and Culture of Pearl Oysters (Bivalvia: Pteriidae). ODA, London.
5. Karaca A. (2011). Biology of Earthworms. Springer. London.

Recommended literature

1. Chopin, T., M. Troell, G. Reid, D. Knowler, S.M.C. Robinson, A. Neori, A.H. Buschmann & S. Pang. 2010. Integrated Multi-Trophic Aquaculture – Part II. Increasing IMTA Adoption. Glob. Aquacult. Advoc., 13(E3): 17–21.

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