



ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

1000 София
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Basic Information:

Course Title: Microalgae in research and biotechnology

Lecturer: Assoc. Prof. Juliana Ivanova, PhD

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Total Teaching Hours: 30 h

Annotation (up to 150 words)

Microalgae are responsible for fixing half of the carbon on Earth through the process of photosynthesis and turning it into organic matter. They also have the potential to be a sustainable source of bioenergy. The aim of the course is to introduce students, PhD students and scientists with research interests in the study of microalgae and their biotechnological application. The lectures include specialized information on the cultivation of microalgae - selection of suitable strains for cultivation, isolation and introduction into laboratory cultures, as well as the influence of physiological factors on biomass accumulation. Techniques to optimize growth and biosynthesis of valuable metabolites are being studied. The main methods for analyzing the biochemical components of the algal cell are considered. Special attention is paid to the various applications of microalgae and the extracted biologically active substances, as well as the possibilities of their inclusion in a circular economy.

Course content (brief description by topics or modules)

Topic / Module 1: Introduction: macro- and microalgae, main groups of microalgae used in practice, worldwide distribution.

Topic / Module 2: Isolation of pure cultures, maintenance in culture collections, and laboratory cultivation. Influence of environmental (physiological) factors. Cultivation systems.

Topic / Module 3: Synthesis of microalgal metabolites. Methods for the analysis of microalgal cultures. Applications of microalgae in practice.

Teaching and assessment methods

1. Assessment through a presentation and an oral examination.
2. Assessment through a written examination and an oral examination.

Competencies acquired as a result of training (3–5 points)

1. Fundamental knowledge of the systematics, physiology, and biochemistry of microalgae.
2. Cultivation potential of microalgae and their principal biotechnological applications.
3. Practical training in handling microalgal cultures.

Literature:

1. Dilov, H. (1985). *Microalgae – Mass Cultivation and Applications*. Sofia: Bulgarian Academy of Sciences, pp. 16–28.
2. Ivanova J, Gigova L, Alexandrov S. Successful practices for valorization of microalgal biomass for inclusion in circular economy. *South African Journal of Botany*, 175C, Elsevier, 2024, DOI:10.1016/j.sajb.2024.10.039, 408-425.



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3. Ivanova J, Toshkova-Yotova T, Toshkova R, Deleva V, Georgieva A, Gigova L. Antioxidant and anticancer potential of extracellular polysaccharide from *Porphyridium aerugineum* (Rhodophyta). *Fermentation*, 10, 5, MDPI, 2024, DOI:10.3390/fermentation10050259, 259.

4. Ivanova, J., Kabaivanova L., Petkov G.. Temperature and Irradiance Effects on *Rhodella reticulata* Growth and Biochemical Characteristics. *Russian Journal of Plant Physiology*, 62, 5, 2015.

Additional information (optional) (e.g., special requirements, laboratory equipment, prior knowledge)