**ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН**

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**Basic Information:**

Course Title: **Redox biology – biophysical and molecular nature, mechanisms and new strategies in cancer prevention, diagnosis and treatment**

Lecturer: **Assoc. Prof. Severina Semkova, PhD**

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Total Teaching Hours: **30 hours**

**Annotation (**up to 150 words)

The course is targeted towards PhD students interested in medical biophysics and molecular oncology. More specifically, the topics cover the main biophysical and molecular mechanisms in redox biology with an emphasis on their relationship with cancer. Modern scientific hypotheses and achievements related to the biochemistry of redox-active substances and antioxidants will be examined. Promising approaches for redox-related targeted and personalized cancer therapy, as well as new opportunities for early diagnosis and prevention, will be presented.

**Course content** (brief description by topics or modules)

Topic / Module 1: Redox Biology – basis, biophysical and molecular mechanisms

Topic / Module 2: Antioxidants and their role in the development of modern anticancer therapies

Topic / Module 3: Redox Imaging

Topic / Module 4: Redox Theranostics

**Teaching and assessment methods**

scientific essay and/ or seminar (oral presentation)

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

- Advanced knowledge of redox biology and the molecular mechanisms of oxidative stress
- Ability to analyze the relationship between redox homeostasis and cancer development

- Skills for critical evaluation of contemporary scientific hypotheses and innovative therapeutic approaches
- Competencies in the application of interdisciplinary methods and research approaches
- Skills in scientific communication and the development of research concepts

**Literature:**

1. „Free Radicals in Biology and Medicine“. Halliwell B., Gutteridge J.M.C. Free Radicals in Biology and Medicine. 5th ed. Oxford University Press, 2015. ISBN: 9780198717478.
2. „Redox Biology in Medicine“. Yoshikawa T., Naito Y., Yamamoto Y. (eds.). Redox Biology in Medicine: Molecular Mechanisms and Clinical Applications. Springer, 2019.
3. „Emerging classes of antioxidant to cancer therapy: a review of clinical and experimental studies“. Ain Q., Choudhary M.I. “Emerging classes of antioxidant to cancer therapy: a review of clinical and experimental studies.” 2020.
4. „Redox Active Cerium Oxide Nanoparticles: Current Status and Burning Issues“. Lord M.S., Berret J.F., Singh S., Vinu A., Karakoti A.S. “Redox Active Cerium Oxide Nanoparticles: Current Status and Burning Issues.” 2021.
5. „A randomized trial of pharmacological ascorbate, gemcitabine, and nab-paclitaxel for metastatic pancreatic cancer“. Bodeker K.L. et al. “A randomized trial of pharmacological ascorbate, gemcitabine, and nab-paclitaxel for metastatic pancreatic cancer.” Redox Biology, 2024, 77:103375.