

UNIVERSITY OF BELGRADE
FACULTY OF MEDICINE
PhD STUDIES

NAME OF THE MODULE: Biomedical Informatics

CONTENT OF THE PROGRAM: The Biomedical Informatics (BMI) module examines the unique characteristics of clinical and life science data and the methods for representation and transformation of health data, information, and knowledge to improve health care. The program is intellectually rigorous, and emphasizes research in novel computational methods aimed at advancing biology and medicine. Through obligatory and elective courses, the programme provides an understanding of methods underlying many biomedical informatics applications, including information retrieval, medical decision making, evaluation of evidence, and knowledge representation. BMI focuses more on informatics issues of knowledge representation and reasoning, data mining and analysis, and machine learning i.e. places greater emphasis on method development and evaluation than on basic science. During the programme students develop foundational concepts of computation and analytical thinking that are instrumental in solving challenging problems in health care. Principles of information security and confidentiality are taught, along with functional components of information systems in clinical settings and the use of databases for outcome management. Students are introduced to health information technology evaluation, with exposure to study design, including sampling, appropriate use of controls; data collection, including human subjects research considerations; analysis, including testing for statistical significance, and reporting of results. The programme introduces students to the experimental context and implementation of key algorithms in bioinformatics (molecular and cellular processes) and clinical imaging (tissues and organs). In addition it engages students in discovering relationships among individuals, institutions, and technologies (patient level), and how those relationships are evolving in specific cultural contexts (society level). The programme enhances students' skills in written and oral scientific communication. The scientific writing, the peer review process, and ethical issues in research communication are covered. Programme provides direct, hands-on experience in writing papers, abstracts, and grant proposals; critiquing and copy editing; and preparing and giving presentations for scientific meetings. The BMI PhD group is dynamic and engaged, breaking new ground in medical research as evidenced by our strong publication records. Our students are highly collaborative, frequently assisting on each other's projects, sharing ideas, and supporting each other. In addition, students work under close supervision of a specific faculty member on an ongoing research problem, and assist in teaching.

ADMISSION REQUIREMENTS: General requirements: completed integrated academic study program in medical sciences lasting 6 years (360 ECTS), or completed academic studies (undergraduate + master) in other fields (300 ECTS). Specific conditions: average grade from the previous level of study at least 8, knowledge of English at the middle course level, appropriate

computer skills, desirable recommendations related to scientific research. Each candidate will be invited for an interview before a commission consisting of potential mentors and members of the Advisory board in Biomedical Informatics.

MEMBERS OF THE ADVISORY BOARD: prof. dr Nataša Milić (chair), prof. dr Dejana Stanisavljević and prof. dr Biljana Miličić

OBLIGATORY COURSES: Methodology of scientific research, Informatics in biomedical research, Biostatistics (basics), Medical ethics, Medical informatics methods I, Medical informatics methods II, Biostatistics (advanced)

ELECTIVE COURSES: Methods of evaluation and information synthesis, Bioinformatics, Medical decision making, Processing biomedical digital signals/imaging, R computing language