Table 5.2 Course specification

Level: Bachelor
Course title: Bioorganic Chemistry
Status: obligatory
ECTS: 8
Requirements: none
Course aim To enable the student to understand the mechanisms of fundamental biochemical processes and the basic functions of complex biological systems, using modern chemical methods and selected model systems.
Course outcome Upon successful completion of this course, the student is able to: (1) explain the mechanisms of action of the selected enzymes and appropriate model systems by applying the effects of proximity and orientation, as well as binding, noncovalent interactions; (2) identifies and defines supramolecular interactions in selected model systems of bioorganic receptor, transporter and catalyst; (3) recognize and explain binding supramolecular interactions in selected biological receptors, transporters, and catalysts; (4) explain the strategy and demonstrate methods for the synthesis of amino acids, peptides, nucleosides and analogues; (5) identify and explain the biomimetic phases of enantioselective amino acid synthesis; (6) identifies enzymes and appropriate inhibitors of biomedicinal importance.
Course content *Theory* Simple models of biological catalysis: comparison with mechanism of action of the corresponding enzymes (effects of proximity and orientation). Kemp acid derivatives as bioorganic models of biological receptors and transporters. The crown ethers as bioorganic models of ionic receptors and transporters. Cyclodextrins and derivatives as model systems of biological receptors and catalysts. Comparison of bioorganic models with corresponding natural systems. Bioorganic chemistry of amino acids. Bioorganic chemistry of peptides and peptidomimetics. Enzymatic inhibitors of potential importance for biomedicine: structure, design and mechanism of action. *Practice: Practical classes, OFT, SRW* Laboratory exercises: Multiphase synthesis of selected biologically active molecules, their analogues and system model. Structural characterization of reaction intermediates and final products by spectroscopic methods. Computer exercises: *In silico* design of selected bioorganic models of receptors, transporters and enzymes. Identification and visualization of supramolecular interactions in enzyme-inhibitor complexes of biomedicinal importance.
Literature H. Dugas: Bioorganic Chemistry – A Chemical Approach to Enzyme Action, Third Edition, Springer-Verlag, New York, 1999. A. Miller, J. Tanner, Essentials of Chemical Biology, John Wiley & Sons, Ltd. Chichester, 2008. P. D. Beer, P. A. Gale, D. K. Smith: Supramolecular Chemistry, Oxford University Press, Oxford, 1999. J. Jones: Amino Acid and Peptide Synthesis, Second Edition, Oxford University Press, Oxford, 2002.