

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                              |                                    |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------|------------------------------------|
| Study programme                        | MEDICAL STUDIES IN ENGLISH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                              |                                    |
| Cycle                                  | INTEGRATED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Type        | UNIVERSITY                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                              |                                    |
| Study track                            | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module      | -                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |                              |                                    |
| Year of study                          | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Semester    | III                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |                              |                                    |
| Course title                           | MEDICAL CHEMISTRY AND BIOCHEMISTRY II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Course code | MFMSE301                                                                                                                                                                                                                                                                                                                                                                                                                             |           |                              |                                    |
| ECTS                                   | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Status      | OBLIGATORY                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                              |                                    |
| Teaching hours                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             | Lectures                                                                                                                                                                                                                                                                                                                                                                                                                             | Exercises | Seminars                     | Practice                           |
|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             | 42                                                                                                                                                                                                                                                                                                                                                                                                                                   | 34        | 34                           | 0                                  |
| Teachers                               | Asst. prof. Gloria Zlatić Jelić, PhD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10        |                              |                                    |
|                                        | Asst. prof. Ivana Carev, PhD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 27          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                    | 18        |                              |                                    |
|                                        | Senior assistant Martina Vukoja,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             | 9                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6         |                              |                                    |
|                                        | Senior assistant Ante Pušić,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             | 12,5                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                              |                                    |
|                                        | Assistant Ivona Cvetković,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             | 12,5                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                              |                                    |
| Course objectives                      | <div>- To achieve students' understanding of the functioning of the organism at the molecular level, which is reflected in the normal function of the organs as well as in the pathological biochemical processes in the organism.</div> <div>- To achieve students' understanding of the role of natural biomolecules in the body.</div> <div>- To achieve students' understanding of the dynamics of synthesis and degradation of natural biomolecules: proteins, carbohydrates, lipids and nucleic acids.</div> <div>- To achieve students' understanding of the influence of hormones on the function of the main organ systems.</div> |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                              |                                    |
| Course learning outcomes               | Learning outcome (LO)<br>Student:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | Course learning outcome code | LO code at the study program level |
|                                        | Describes and presents the role of biomolecules in the human body.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-1                | IU-MSE2                            |
|                                        | Describes and explains the mechanisms of synthesis and degradation of natural macromolecules: proteins, carbohydrates, lipids and nucleic acids.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-2                | IU-MSE3                            |
|                                        | Explains the principles of regulation and control of cellular metabolism, using biochemical and metabolic arguments to explain physiological and pathophysiological processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-3                | IU-MSE3                            |
|                                        | Draws the structure of biomolecules.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-4                | IU-MSE1                            |
|                                        | Calculates the number of moles of ATP that are generated/consumed in the metabolism of natural macromolecules.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-5                | IU-MSE3                            |
|                                        | Calculates the charge of a polypeptide at a given pH.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           | IU-MFMSE301-6                | IU-MSE1                            |
|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                              |                                    |
| Prerequisites for the course enrolment | In accordance with the Rulebook on the Integrated Studies at the School of Medicine University of Mostar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                              |                                    |
| Course content                         | Week / shift                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                              |                                    |
|                                        | Lectures:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             | (L1) The Conformation and Dynamics of Protein Structure<br>(L2) Proteins with Special Functions: Hemoglobin, Myoglobin<br>(L3) Proteins with Special Functions: Collagen, Elastin<br>(L4) Proteins with Special Functions: Actin, Myosin<br>(L5) Plasma Proteins and Immunoglobulins<br>(L6) Vitamins: role and function<br>(L7) Coenzyme; Bioenergetics: The role of ATP<br>(L8) Enzyme catalysis<br>(L9) Metabolism of Nucleotides |           |                              |                                    |

|                                                                                                                            |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------|---------------|--------------------|----------------|
|                                                                                                                            |                                                                                                                                                                                                              | (L10) Nucleic Acid Structure & Function<br>(L11) DNA Organization, Replication & Repair<br>(L12) RNA Synthesis, Processing & Modification; Protein Synthesis & the Genetic Code<br>(L13) Regulation of Gene Expression<br>(L14) Molecular Genetics, Recombinant DNA & Genomic Technology<br>(L15) Metabolism of Xenobiotics, Pharmacogenetics<br>(L16) Glycolysis<br>(L17) Glycogen: Synthesis and degradation<br>(L18) Gluconeogenesis, Cori cycle<br>(L19) The Pentose Phosphate Pathway, Fructose, Galactose<br>(L20) Oxidative decarboxylation, Citric acid cycle<br>(L21) The Respiratory Chain & Oxidative phosphorylation<br>(L22) Lipids of Physiologic Significance; Cholesterol Synthesis, Transport & Excretion<br>(L23) Lipid Transport & Storage<br>(L24) Oxidation of Fatty Acids: Ketogenesis<br>(L25) The Diversity of the Endocrine System<br>(L26) Urea Cycle, Metabolism of Amino Acids<br>(L27) Free Radicals & Antioxidant Nutrients<br>(L28) Overview of Metabolism & the Provision of Metabolic Fuels |                        |          |               |                    |                |
|                                                                                                                            | Seminars:                                                                                                                                                                                                    | At the seminars, students will solve some tasks about specific topics. They will make presentations about seminar topic given by teacher.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |          |               |                    |                |
|                                                                                                                            | Exercises:                                                                                                                                                                                                   | (E1) Qualitative detection of protein<br>(E2) Serum protein electrophoresis<br>(E3) Ionization properties of amino acids<br>(E4) Enzyme kinetics<br>(E5) Monosaccharides and polysaccharides determination<br>(E6) Lipids<br>(E7) Acid-base and mineral status in organism<br>(E8) Qualitative urine analysis<br>(E9) Creatinine Clearance<br>(E10) Human DNA isolation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |          |               |                    |                |
| Language                                                                                                                   | English                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| E-learning                                                                                                                 | Classes are taken in person. If necessary, lectures, seminars and part of the exercises can take place combined (live and online) or completely online via e-learning platforms (Google Meet) up to max 20%. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| Teaching methods                                                                                                           | Teaching, interactive and active-experiential.                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| Types of assessment (indicate - <b>Bold</b> )                                                                              |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| Type of pre-examination obligation                                                                                         |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          | Type of exam  |                    |                |
| midterm                                                                                                                    | seminar paper                                                                                                                                                                                                | essay/report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | practical/project task | other    | written exam  | oral exam          | practical      |
| Allocation of ECTS credits and share in the grade                                                                          |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| Student obligations                                                                                                        |                                                                                                                                                                                                              | Learning outcome code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Hours of workload      |          | Share in ECTS |                    | Share in grade |
| Attending classes                                                                                                          |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 110                    |          | 3.7           |                    | 0%             |
| Seminar                                                                                                                    |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10                     |          | 0.3           |                    | 0%             |
| Midterm/Colloquium of exercises                                                                                            |                                                                                                                                                                                                              | IU-MFMSE301-1<br>IU-MFMSE301-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15                     |          | 0.5           |                    | 0%             |
| Pre-exam/Written exam                                                                                                      |                                                                                                                                                                                                              | IU-MFMSE301-1<br>IU-MFMSE301-2<br>IU-MFMSE301-3<br>IU-MFMSE301-4<br>IU-MFMSE301-5<br>IU-MFMSE301-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 105                    |          | 3.5           |                    | 100%           |
| In total                                                                                                                   |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 240                    |          | 8             |                    | 100%           |
| Method of calculating the final grade                                                                                      |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| The final grade is based on the written exam. A detailed description is provided in additional information about the case. |                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |               |                    |                |
| Literature                                                                                                                 | Title                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Edition                | Language |               | Type of literature |                |

| (indicate) | (title, author, year)                                                                                                                             | own | other | croatian | english | other | multilingual | book | article | script | other |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|----------|---------|-------|--------------|------|---------|--------|-------|
| Compulsory | Harper's Illustrated Biochemistry 31st Edition; V. Rodwell, D. Bender, K. Botham, P. Kennelly, PA. Weil; 2018.                                    |     | x     |          | x       |       |              | x    |         |        |       |
|            | Biochemistry, 9th Edition, Berg JM, Tymoczko JL, Gatto Jr. GJ, Stryer L., 2019.                                                                   |     | x     |          | x       |       |              | x    |         |        |       |
|            | Medical chemistry and biochemistry exercises handbook for medical students, I. Mikulić, N. Jelić Knezović, V. Mikulić, K. Landeka, A. Čuk., 2014. | x   |       |          | x       |       |              |      |         | x      |       |
|            | Scientific papers for seminars, different authors                                                                                                 |     | x     |          | x       |       |              |      |         | x      |       |
|            | teaching materials                                                                                                                                |     | x     |          | x       |       |              |      |         |        | x     |

#### Additional course information

As it is a basic course in a specific field of biochemistry, in addition to theoretical classes, by processing selected different seminar topics and solving tasks, the student further expands his knowledge and can demonstrate the ability to think critically and recognize the essential elements of a certain educational issue.

The course in medical chemistry and biochemistry II. contains 110 hours and takes over 5 weeks, which also includes a post-class examination period (pre-exam).

Classes consist of lectures, seminars and exercises.

In order to take the exam, the student is required to fulfill all the other following obligations: attend classes regularly, prepare and present a seminar essay on the given topic, do exercises in the practical part of the class, support them with an appropriate report.

To pass the pre-exam/written exam (grade sufficient), student has to answer 55% of the questions correctly.

According to the Rulebook on studying at the University of Mostar, grades are assigned as follows:

0-54% insufficient (1);

55-66% sufficient (2);

67-78% good (3);

79- 90% (very good 4);

91-100% excellent (5).