

## COURSE OUTLINE "BIOLOGY-BIOLOGICAL CHEMISTRY"

### GENERAL

|   |   |                 |          |
|---|---|-----------------|----------|
| <b>SCHOOL</b>   | LIFE SCIENCES   |                 |          |
| <b>ACADEMIC UNIT</b>  | DEPARTMENT OF MEDICINE                                      |                 |          |
| <b>LEVEL OF STUDIES</b>   | POSTGRADUATE, BASIC BIOMEDICAL SCIENCES (BBS)               |                 |          |
| <b>COURSE CODE</b>  | <b>BBE-101</b>  | <b>SEMESTER</b> | <b>A</b> |
| <b>COURSE TITLE</b>   | BIOLOGY-BIOLOGICAL CHEMISTRY                                |                 |          |
| <b>INDEPENDENT TEACHING ACTIVITIES</b><br><i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i> | <b>WEEKLY TEACHING HOURS</b>                                | <b>CREDITS</b>  |          |
| Lectures  | 4   |                 |          |
| Laboratory exercises-tutorial (analysis of techniques)  | 2   |                 |          |
| Laboratory exercises (cell culture analysis)  | 2   |                 |          |
| <i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>  |   |                 |          |
| <b>COURSE TYPE</b><br><i>general background, special background, specialised general knowledge, skills development</i>  | General background<br>Skills development                    |                 |          |
| <b>PREREQUISITE COURSES:</b>  | There are no prerequisite courses                           |                 |          |
| <b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>  | Greek   |                 |          |
| <b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>  |   |                 |          |
| <b>COURSE WEBSITE (URL)</b>   | The lectures are offered to the students updated via e-mail |                 |          |

## LEARNING OUTCOMES

### Learning outcomes

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

### Subject of the lesson:

The Biology-Biological Chemistry course is considered basic, because it has as its subject and important areas of Biology and Biological Chemistry that are related to the following:

- 1) The recombinant DNA
- 2) Detection of nucleic acids and proteins
- 3) The functional study of eukaryotic genes
- 4) The copying, maintenance and rearrangements of genomic DNA
- 5) DNA damage and repair
- 6) Recombination between homologous DNA sequences
- 7) DNA rearrangements
- 8) The synthesis and processing of RNA
- 9) RNA regulation
- 10) Cell signalling
- 11) Protein synthesis, processing and regulation of their function
- 12) The regulation of metabolism through signal transduction
- 13) Protein folding: Diseases, mechanisms and cellular response
- 14) The cytoskeleton and cellular connections
- 15) The Cell cycle
- 16) Cell death
- 17) The nucleus, the nuclear envelope and the circulation of molecules between the nucleus and the cytoplasm
- 18) The organization of chromosomes
- 19) The nuclear particles
- 20) Cancer
- 21) The role of siRNAs and microRNAs in gene regulation. association with diseases
- 22) Animal models in human medicine
- 23) Apoptosis and metabolic disorders.

The course is a mix of basic cellular and molecular mechanisms with examples of modern technology and detection of large cellular biomolecules.

**Form and outcomes of teaching:** The course is taught in combination with the laboratory-tutorial exercises, which concern Cell Culture.

The learning objective of the Biology-Biological Chemistry course and the exercises is for the student at the end of the educational program to be able to:

- a) To know the operating modes of basic cellular-molecular mechanisms and ways of managing large biomolecules (DNA, RNA, Proteins).
- b) To understand how the techniques of modern technology work and where they are based
- c) To understand the molecular basis of some important diseases
- d) To know about the animal models that he should choose and are suitable for an experimental program.

**Training hours for each student: 100**

**Education semester: A**

**ECTS: 7**

### General Skills

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adaptation to new situations

- Decision making
- Autonomous work
- Teamwork
- Work in an international environment
- Work in an interdisciplinary environment
- Generating new research ideas
- Respect for diversity and multiculturalism
- Project planning and management
- Demonstrating social, professional and ethical responsibility and sensitivity to gender issues
- Exercise criticism and self-criticism
- Promotion of free, creative and inductive thinking
- Search, analysis and synthesis of data and information, using the necessary technologies
- Adaptation to new situations
- Autonomous work
- Teamwork
- Work in an international environment
- Work in an interdisciplinary environment
- Generating new research ideas
- Exercise criticism and self-criticism

### **General Competences**

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and information, with the use of the necessary technology*

*Adapting to new situations*

*Decision-making*

*Working independently*

*Team work*

*Working in an international environment*

*Working in an interdisciplinary environment*

*Production of new research ideas*

*Project planning and management*

*Respect for difference and multiculturalism*

*Respect for the natural environment*

*Showing social, professional and ethical responsibility and*

*sensitivity to gender issues*

*Criticism and self-criticism*

*Production of free, creative and inductive thinking*

*.....*

*Others...*

*.....*

**Learning objectives for the students:**

## **SYLLABUS**

- Basic principles of Cell and Molecular Biology
- Genomics-Proteomics
- Human genome
- Replication and maintenance of genomic DNA
- RNA synthesis and processing
- Setting up transcription
- Regulation of metabolism through signal transduction
- Protein folding: diseases, mechanisms and cellular response
- Protein synthesis, processing and regulation of their function
- Protein folding: diseases, mechanisms and cellular response
- The cytoskeleton and cell connections
- Cell cycle
- Cell death
- Cancer
- The role of siRNAs and microRNAs in gene regulation. association with diseases
- Animal models in human medicine
- Apoptosis and metabolic disorders.
- The nuclei

## TEACHING and LEARNING METHODS - EVALUATION

| <p style="text-align: center;"><b>DELIVERY</b></p> <p><i>Face-to-face, Distance learning, etc.</i></p>   | <p>Lifelong education</p> <p>The theoretical part of the course is taught through lectures (in the Lecture Halls, with direct physical presence and teacher-student interaction). Additionally, as part of the tutorial exercises, students attend lectures during which they become familiar with advanced scientific research techniques.</p>   |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
|--|---|--|-----------------|--------------------------|----------|----|-----------|----|--------------------------|----|--------------|----|-------------------|----|---------------------|------------|
| <p style="text-align: center;"><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b></p> <p><i>Use of ICT in teaching, laboratory education, communication with students</i></p>   | <p>Presentation of slides (powerpoint slides) and video in the context of the course's delivery.</p> <p>All slides and videos are posted on the University's website, asynchronous distance learning platform (e-course) and are freely accessible by students. The course slides are updated at least once a year (each academic year). Also, through the e-course, students have access to additional educational material (eg important relevant articles from the international literature). Communication with the students for practical issues, announcements, but also questions regarding a better understanding of the course material and their preparation for the exams, is done through the e-course platform (see Messages, Discussion Forum at <a href="http://ecourse.uoi.gr/course/view.php?id=209">http://ecourse.uoi.gr/course /view.php?id=209</a>), but also through messages to the e-mail addresses of the teachers that are available. Notes, original scientific articles and historical scientific documents are sent to students' personal e-mails.</p> |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| <p style="text-align: center;"><b>TEACHING METHODS</b></p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>                         | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity</i></th> <th style="text-align: center;"><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">48</td> </tr> <tr> <td>Tutorials</td> <td style="text-align: center;">12</td> </tr> <tr> <td>Preparation for lectures</td> <td style="text-align: center;">20</td> </tr> <tr> <td>bibliography</td> <td style="text-align: center;">20</td> </tr> <tr> <td>Independent study</td> <td style="text-align: center;">80</td> </tr> <tr> <td><b>Course total</b></td> <td style="text-align: center;"><b>180</b></td> </tr> </tbody> </table>  |  | <i>Activity</i> | <i>Semester workload</i> | Lectures | 48 | Tutorials | 12 | Preparation for lectures | 20 | bibliography | 20 | Independent study | 80 | <b>Course total</b> | <b>180</b> |
| <i>Activity</i>  | <i>Semester workload</i>  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| Lectures   | 48  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| Tutorials  | 12  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| Preparation for lectures   | 20  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| bibliography   | 20  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| Independent study  | 80  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| <b>Course total</b>  | <b>180</b>  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |
| <p style="text-align: center;"><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p> | <p>Greek</p> <p>Written final exam</p> <p>The written exam includes:</p> <ul style="list-style-type: none"> <li>• Short answer questions</li> <li>• Questions of short development of a topic</li> <li>• Questions combining material from various chapters</li> <li>• Questions that require critical thinking/reasoning</li> <li>• Multiple choice or double choice questions</li> <li>• (The weight of the questions is weighted so that the average degree of difficulty of the set of questions is similar in each written exam)</li> </ul>  |  |                 |                          |          |    |           |    |                          |    |              |    |                   |    |                     |            |

## ATTACHED BIBLIOGRAPHY

*- Suggested bibliography:*

- A Molecular Approach, Volumes I & II (Book [33133232]) (The Cell: A Molecular Approach, Geoffrey M. COOPER & Robert E. HAUSMAN, Boston University, 5th Edition, 2009, SINAUER Associates, INC., MA/ASM Press Washington, D.C.), Academic Publications 2011, I. BASDRA & SIA.

*- Related academic journals:*

- Related current reviews