

## **7<sup>th</sup> SEMESTER**

### **Pharmaceutical Biotechnology**

**Code:** ΝΠ-35

**Cycle/Level:** 1st / Undergraduate

**Semester:** 7th

**Type of Course**

	Background
<b>X</b>	Scientific Area (Pharmacy)

**ECTS:** 4

**Lectures (hours):** 3

**Tutorials (hours):**

**Laboratory Work / Written Assignments (hours):** 2

**Course Coordinator:** Christos Panagiotidis, Professor

**Faculty Instructors**

Christos Panagiotidis, Professor <http://users.auth.gr/pchristo/>

Theodoros Sklaviadis, Professor

Lefkothea Papadopoulou, Associate Professor

**Teaching Assistants:** -

**Learning Outcomes:** To introduce students to the rapidly developing, in recent years, area of «Pharmaceutical Biotechnology» and familiarize them with the basic concepts, technologies and applications of molecular biotechnology in the production of pharmaceuticals, using enzymes, genes, genetically modified organisms and plants.

**General Competences:** Apply knowledge in practice; retrieve, analyze and synthesize data and information, with the use of necessary technologies; adapt to new situations; work autonomously, work in teams; work in an international context; work in an interdisciplinary team; generate new research ideas; respect natural environment; Advance free, creative and causative thinking. These targets are being achieved through a combination of lecture presentations and bibliographic assignments (written papers and oral presentations) in selected topics in Pharmaceutical Biotechnology. The oral presentations of these assignments are designed to help the students develop both creative thinking and presentation skills pertaining to the expression/presentation of complex scientific aspects.

**Teaching methods:**

Lectures, tutorials and student presentations of selected topics in Pharmaceutical Biotechnology.

**Course Content:**

Molecular Biotechnology (Principles and applications) – Gene cloning, identification and gene expression for producing recombinant proteins – Expression systems for recombinant protein production (bacteria, fungi, plant cells/plants, mammalian cells etc.) – Problems associated with recombinant protein production (factors affecting protein expression levels, as well as protein folding and functionality) – Technologies of intracellular transport of recombinant proteins – Protein transduction technologies – Formulation of therapeutic proteins – Pharmacokinetics, pharmacodynamics and immunogenicity of therapeutic proteins – Hematopoietic and growth factors – Interferons – Interleukins – Insulin, growth hormone and other peptide hormones –

Recombinant human coagulation and thrombolytic factors – Therapeutic and diagnostic antibodies – Vaccines – Genomics and other –omics technologies – Gene therapy – Cell therapies and regenerative medicine – Biotherapeutics and biosimilars – Regulatory issues related to the quality, production and licensing of biotherapeutics – Bioethics and issues related to the use of genetically modified organisms in producing biotherapeutics.

**Educational activities:**

Lectures, tutorial and, following in-depth bibliography mining, organization, writing and presentation of student work on selected Pharmaceutical Biotechnology topics.

**Evaluation process and methods:**

Student performance is evaluated in written exams (maximum duration: 3 hours) that take place at the end of the semester (90% of the final grade), as well as during the presentation of the student bibliographic assignments (10% of the final grade).

**Use of ICT (Information and communication technologies) / Electronic distribution of the course materials:**

ICT is being used both in the lectures and the tutorials of the course (Powerpoint presentations, interactive tutorials using ICT, videos etc.).

Lecture materials, as well as course and exam announcements, exam results etc. are posted on the webpages of the course instructors (Prof. Christos Panagiotidis, <http://users.auth.gr/pchristo/>, Prof. Theodoros Sklaviadis, and Assoc. Prof. Lefkothea Papadopoulou (<http://www.pharm.auth.gr/papadopoulou/index.html>), as well as on the webpage of the School of Pharmacy, AUTh (<http://www.pharm.auth.gr/el>). Furthermore, email is extensively used, together with person-to-person interactions, for the communications between students and course instructors.