COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES			
DEPARTMENT	FOOD SCIENCE AND NUTRITION			
EDUCATION LEVEL	*Undergraduate*			
LECTURE CODE	ΒΠ-413	**SEMESTER**	4th	
LECTURE TITLE	Bioinformatics			
SELF-ENDED TEACHING ACTIVITIES			**WEEKLY TEACHING HOURS**	**CREDIT UNITS (ECTS)**
LECTURES			3	3
LABORATORY EXERCISES			3	3
			6	6
COURSE TYPE	Scientific area of Molecular Biology and Bioinformatcs			
PREREQUISITE COURSES:				
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes (English)			
COURSE WEBSITE (URL)	https://food.uth.gr/theodoros-goulas/			

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, the student will be able to:

• Know how to perform information searches, using browsers, in databases and university libraries.

• Know how to operate some technical / scientific software programs

• Know how to carry out simple computer programs and how to apply them to solve specific problems in biology.

• Understand basic concepts related to genetic information flow and storage.

• Understand and uses the methods and techniques used to understand the transfer of genetic information as well as the analysis

• Apply the methods of DNA, RNA and protein analysis with Bioinformatics tools.

• Uses basic bioinformatics tools to extract information from databases.

• Understands the importance of Bioinformatics in Food Science and Nutrition

General Skills

1. Search, analysis and synthesis of data and information, also using the necessary technologies.
2. Adaptation to new situations.
3. Decision making.
4. Autonomous work.
5. Group work.
6. Generation of new research ideas.
7. Project planning and management.
8. Exercise criticism and self-criticism
9. Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Theory

1st Week
Introduction to Bioinformatics.

2nd Week
Access to biological sequence data and digital libraries.

3rd Week
Pairwise alignment of sequences.

4th Week
BLAST. Basic local alignment search tool.

5th Week
Advanced sequence search programs.

6th Week
Multiple sequence alignment.

7th Week
Molecular phylogeny and evolution.

8th Week
Analysis of Next Generation Sequencing data.

9th Week
Protein structure and protein databases.

10th week
Protein analysis and proteomics

11th week
Gene expression: analysis of data from microarrays and RNA-seq

12th Week
Use of Bioinformatics in Food and Nutrition Science

13th Week
Recap of the basic concepts of Bioinformatics.

Laboratory Exercises

1st Week
Information retrieval from bioinformatic databases.

2nd – 3rd Week
Search for local alignment using the BLAST tool.

4th Week

Search for local alignment using advanced search tools.

5th Week
Analysis of multiple sequence alignments.

6th - 7th Week
Phylogenetic tree construction and interpretation.

8th Week
Using CHIMERA-X software to visualize protein models.

9th Week
Application of Bioinformatics in Food and Nutrition Science

10th - 11th Week
Presentation of Works

12th Week
Review of laboratory exercises

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td>Delivery method</td><td>In person</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>Specialized Software (ChimeraX, Pymol, Geneious, SnapGene, JalView, EndNote, Phenix, CCP4, COOT)</td></tr>
<tr><td>TEACHING ORGANIZATION</td><td>
<table>
<tr><th>Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>39
(13 week x 3 hours)</td></tr>
<tr><td>Laboratory Exersises</td><td>12
(6 Lab. Ex.. x 2 hours)</td></tr>
<tr><td>Report of laboratory exercises</td><td>30</td></tr>
<tr><td>Elaboration of a study</td><td>30</td></tr>
<tr><td>Preparation for written exam</td><td>39
(13 Διαλ. x 3 ώρες)</td></tr>
<tr><td>Total Course
(25 workload hours per credit unit)</td><td>150
(6 ECTS)</td></tr>
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<tr><td>STUDENT EVALUATION</td><td>I. Written exam (80 %) of graded difficulty including:
- Multiple choice questions
- Short questions to develop
- Questions of crisis and development

II. Laboratory exercises (20%):
- Participation and performance during the laboratory exercise
- Written report of laboratory results</td></tr>
</table>

	Therefore: the total grade is obtained as a sum of the above two individual evaluations.

5. SUGGESTED BIBLIOGRAPHY

-*Suggested Bibliography :*

1. Εισαγωγή στη Βιοπληροφορική, ARTHUR M. LESK
2. Βιοπληροφορική, A. BAXEVANIS, B.F. OUELLETTE
3. ΒΙΟΠΛΗΡΟΦΟΡΙΚΗ, Σοφία Κοσσιδά
4. Βιοπληροφορική-Εφαρμογές Υπολογιστών στη Φροντίδα Υγείας και τη Βιοϊατρική, Cimino J., Shortlife

-*Related Scientifc Journals:*

BioData Mining.
Bioinformatics.
Bioinformatics and Biology Insights.
BMC Algorithms for Molecular Biology.
BMC Bioinformatics.Nature
Science
Cell
Gene
PNAS USA
Molecular Cell Biology
Current Biology