



## National University of Engineering (UNI)

School of Computer Science  
Syllabus 2024-II

### 1. COURSE

BI101FCCS. Biology I (Mandatory)

### 2. GENERAL INFORMATION

2.1 Course	: BI101FCCS. Biology I
2.2 Semester	: 2 <sup>nd</sup> Semester.
2.3 Credits	: 3
2.4 Horas	: 2 HT; 2 HP;
2.5 Duration of the period	: 16 weeks
2.6 Type of course	: Mandatory
2.7 Learning modality	: Face to face
2.8 Prerequisites	: None

### 3. PROFESSORS

Meetings after coordination with the professor

### 4. INTRODUCTION TO THE COURSE

Biology is the science of life, and while it may not seem immediately relevant to computer science, it provides a foundation for interdisciplinary fields such as bioinformatics, computational biology, and biologically inspired artificial intelligence. This course introduces the fundamental concepts of biology, from the cell to evolution.

### 5. GOALS

- Understand the basic principles of cellular and molecular biology.
- Learn the fundamental processes of life, such as DNA replication, transcription, and translation.
- Appreciate the interrelationship between biology and computing in areas like bioinformatics.

### 6. COMPETENCES

1) Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions. (Assessment)

6) Apply computer science theory and software development fundamentals to produce computing-based solutions. (Usage)

**AG-C01)** The Professional and the World: Analyzes and evaluates the impact of solutions to complex computing problems on the sustainable development of society. (Usage)

**AG-C07)** Computing Knowledge: Applies appropriate knowledge of mathematics, science, and computing. (Assessment)

**AG-C12)** Applies computer science theory and software development fundamentals to produce computer-based solutions. (Usage)

### 7. TOPICS

<b>Unit 1: Introduction to Biology (4 hours)</b>	
<b>Competences Expected: 1,AG-C07</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• Characteristics of living organisms.</li> <li>• Levels of biological organization.</li> <li>• The scientific method in biology.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the characteristics of living organisms. [Familiarizarse]</li> <li>• Identify the different levels of biological organization. [Usar]</li> <li>• Apply the scientific method in the context of biology. [Evaluar]</li> </ul>
<b>Readings :</b> [al17], [Rav+17]	

<b>Unit 2: The Cell (8 hours)</b>	
<b>Competences Expected: 1,AG-C07</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• Cell structure: prokaryotes and eukaryotes.</li> <li>• Cell membranes and transport.</li> <li>• Cell metabolism: respiration and photosynthesis.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and contrast prokaryotic and eukaryotic cells. [Familiarizarse]</li> <li>• Describe the mechanisms of transport across cell membranes. [Usar]</li> <li>• Explain the processes of respiration and photosynthesis. [Evaluar]</li> </ul>
<b>Readings :</b> [al17], [Rav+17]	

<b>Unit 3: Molecular Genetics (12 hours)</b>	
<b>Competences Expected: 1,AG-C07</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• DNA: structure and replication.</li> <li>• RNA: transcription and translation.</li> <li>• Gene regulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the structure and replication of DNA. [Familiarizarse]</li> <li>• Explain the processes of transcription and translation. [Usar]</li> <li>• Understand the mechanisms of gene regulation. [Evaluar]</li> </ul>
<b>Readings :</b> [al17], [Rav+17]	

<b>Unit 4: Evolution (8 hours)</b>	
<b>Competences Expected: 1,AG-C07</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• Theory of evolution by natural selection.</li> <li>• Evidence of evolution.</li> <li>• Mechanisms of evolution.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the theory of evolution by natural selection. [Familiarizarse]</li> <li>• Describe the evidence of evolution. [Usar]</li> <li>• Analyze the different mechanisms of evolution. [Evaluar]</li> </ul>
<b>Readings :</b> [al17], [Rav+17]	

<b>Unit 5: Biology and Computing (8 hours)</b>	
<b>Competences Expected: 1,AG-C07,AG-C12</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• Bioinformatics: analysis of biological sequences.</li> <li>• Computational biology: modeling and simulation of biological systems.</li> <li>• Biologically inspired algorithms.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe applications of bioinformatics. [Familiarizarse]</li> <li>• Explain how computation is used in biology. [Usar]</li> <li>• Analyze examples of biologically inspired algorithms. [Evaluar]</li> </ul>
<b>Readings :</b> [al17]	

<b>Unit 6: Ecology and Biodiversity (8 hours)</b>	
<b>Competences Expected: 1,AG-C01,AG-C07</b>	
Topics	Learning Outcomes
<ul style="list-style-type: none"> <li>• Ecological interactions.</li> <li>• Biodiversity and conservation.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the interactions between organisms and their environment. [Familiarizarse]</li> <li>• Explain the importance of biodiversity and conservation. [Usar]</li> <li>• Analyze the impact of human activities on biodiversity. [Evaluar]</li> </ul>
<b>Readings :</b> [al17], [Rav+17]	

## 8. WORKPLAN

### 8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

### 8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

### 8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

## 9. EVALUATION SYSTEM

\*\*\*\*\* EVALUATION MISSING \*\*\*\*\*

## 10. BASIC BIBLIOGRAPHY

[al17] Lisa A. Urry et al. *Campbell Biology*. Pearson, 2017.

[Rav+17] Peter H. Raven et al. *Biology*. McGraw-Hill Education, 2017.