



## Information about the subject

**Degree:** Bachelor of Science Degree in Medicine

**Faculty:** Faculty of Medicine and Health Sciences

**Code:** 341104 **Name:** Cell Biology

**Credits:** 6,00 **ECTS Year:** 1 **Semester:** 1

**Module:** Morphology, structure and function of the human body

**Subject Matter:** Biology **Type:** Basic Formation

**Field of knowledge:** Health Science

**Department:** -

**Type of learning:** Classroom-based learning

**Languages in which it is taught:** Spanish

### Lecturer/-s:

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## Module organization

### Morphology, structure and function of the human body

Subject Matter	ECTS	Subject	ECTS	Year/semester
Morphology and microscopic structure of the human body	6,00	Histology	6,00	2/1
Biology	6,00	Cell Biology	6,00	1/1
Anatomy	27,00	Anatomy II	9,00	2/1
		Anatomy III	6,00	2/2
		Embryology and Anatomy I	12,00	1/2
Biochemistry	9,00	Biochemistry and Molecular Biology	9,00	1/2
Physics	6,00	Biophysics	6,00	1/2
Physiology	12,00	Human Physiology I	6,00	2/1
		Human Physiology II	6,00	2/2

## Recommended knowledge

Cell biology covers knowledge of the structure and functions of the cell as living minimum unit, both in unicellular organisms and multicellular. This course is intended to:

- Know the biological bases of life and its evolution.
- Recognize the structure, metabolism and cellular function.
- Entering in cell signaling and cell cycle in normal situations and in pathological conditions.
- Enable the student to analyze microscopic structures of cells and tissues.

It is intended to convey not only the facts, but also the excitement and the challenges posed by contemporary cell biology research.



## Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 Recognize different levels of organization of living beings.
- R2 Identify cellular structures and organelles.
- R3 Be able to produce documents on cell biology and work as a team.
- R4 Distinguish between normal and pathological cellular processes.
- R5 Handle of the basic laboratory material and techniques.
- R6 Handle the optical microscope and recognize with the same different cell types and their basic structural components.
- R7 Recognize and interpret with the optical microscope the different phases of mitosis in rapidly renewing cells and tissues.
- R8 Recognize and interpret at the ultrastructural level the cell membrane, organelles and cytoskeleton components.



## Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	Students have demonstrated to possess and understand knowledge in a study area that starts from the base of the general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study				X
CB2	Students know how to apply their knowledge to their job or vocation in a professional way and possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study				X
CB3	Students have the ability to collect and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical topics				X
CB4	Students can pass on information, ideas, problems and solutions to both a specialized and non-specialized audience				X
CB5	Students have developed the learning skills needed to undertake further studies with a high degree of autonomy				X

GENERAL		Weighting			
		1	2	3	4
CG7	Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes				X

SPECIFIC		Weighting			
		1	2	3	4



CE1	Knowing the structure and cellular function. Biomolecules. Metabolism. Metabolic regulation and integration				X
CE2	Knowing the basic principles of human nutrition. Cellular communication. Excitable membranes. Cell cycle. Cell differentiation and proliferation. Gene information, expression and regulation. Inheritance. Embryonic development and organogenesis				X
CE4	Handling basic laboratory materials and techniques. Interpreting a normal analysis				X
CE6	Performing functional tests, determine vital parameters, and interpret them. Basic physical examination		X		

TRANSVERSAL		Weighting			
		1	2	3	4
CT1	Analytical and synthesis capacity			X	
CT2	Planification and organization capacity			X	
CT3	Oral and written communication in mother language				X
CT4	Foreign language knowledge		X		
CT5	Informatics knowledge	X			
CT6	Manage information capacity		X		
CT7	Solving problems				X
CT8	Making decisions			X	
CT9	Team work		X		
CT14	Critical reasoning				X
CT16	Individual learning				X
CT24	Ability to take responsibility		X		



## Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4	70,00%	Tests
R1, R2, R3	30,00%	Practices
R3	0,00%	Participation in class

### Observations

#### Notes on the evaluation system:

The maximum score for this course is 10 points. In order to pass this course, the student must achieve a score of at least 5. The total points of this course will be obtained by the sum of each of the evaluation instruments mentioned above, provided that the student obtains at least 50% on the final multiple choice exam, of which the maximum score is 5,5.

#### Minimum requirements:

You can not take any course module 1 (Human Clinical Training) without having passed all subjects of Release 3 (Morphology, Structure and Function of Human Body).

#### Criteria for granting honors:

Honor license plates may be granted to the best students, who must have obtained a minimum grade of 9.

If circumstances require, may grant a special test to determine those students deserve the honors, given the limitation of 5% of the students enrolled.

In second and subsequent calls may only be granted the license plate of honor that could subtract after the first call.

#### Development of the subject in second and subsequent registrations:

There will be a specific group for students who are not of first registration if you exceed the occupancy limit of the classroom and a teacher in charge of that group.

The teacher in charge of this group held 6 sessions of monitoring and mentoring of 2 hours each.

The powers to acquire the skills and abilities of the course will take place across all practices scheduled for the course. Each session will run the course so as to strengthen the job skills that every student needs to pass the course.

The evaluation of content and skills in the examination will be held fixed in the official calendar for this subject.



## MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

## Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1	Masterclass
M4	Content presentations by teacher
M5	Knowledges and skills explanation
M6	Laboratory practices
M9	Knowledge acquirance through student interaction and activity
M11	Personalised attention by professor
M12	Tests to understand the level of knowledge acquirance and skills
M13	Written work
M14	Online activity on e-learning
M15	Personal study
M16	Information research
M18	Work in team



## IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theory class M1, M4, M5	R1, R2, R4	36,00	1,44
Seminar and group practices M6	R2, R3, R4	9,00	0,36
Practices in small groups M4, M6	R3, R4	4,50	0,18
Tutoring M4, M5	R1, R2, R4	1,50	0,06
Evaluation M5	R1, R2, R3, R4	1,50	0,06
<b>TOTAL</b>		<b>52,50</b>	<b>2,10</b>

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
No attendance M5, M6	R1, R2, R3, R4	97,50	3,90
<b>TOTAL</b>		<b>97,50</b>	<b>3,90</b>





## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block

Contents

### SECTION I: INTRODUCTION

#### **Unit 1. Overview of the cell and cell research.**

- 1.1 Origin and evolution of cells.
- 1.2 Cells as experimental models.
- 1.3 Cell biology instruments.
- 1.4 Measurement units and dimensions of the cells and their components.

#### **Unit 2. Composition of cells.**

- 2.1. Molecules of the cells. Cell membranes.
- 2.2. Proteomics: analysis on a large scale of cellular proteins.

#### **Unit 3. Cellular metabolism.**

- 3.1 Central role of enzymes as biological catalysts.
- 3.2 Metabolic energy. Biosynthesis of cellular components.



## SECTION II: STRUCTURE AND FUNCTION OF CELLS.

### **Unit 4. Nucleus.**

4.1 Nuclear membrane and traffic between the nucleus and the cytoplasm.

4.2. Internal organization of the nucleus. Nucleolus and rRNA processing.

### **Unit 5. Distribution and transport of proteins: endoplasmic reticulum, Golgi and lysosomes apparatus.**

5.1 Endoplasmic reticulum.

5.2 Golgi apparatus.

5.3 Transport vesicles mechanism.

5.4 Lysosomes

### **Unit 6. Bioenergy and metabolism: mitochondria, chloroplasts and peroxisomes.**

6.1 Mitochondria.

6.2 Mechanism of oxidative phosphorylation.

6.3 Chloroplasts and other plastids.

6.4 Photosynthesis.

6.5 Peroxisomes.

### **Unit 7. Cytoskeleton and cell movement.**

7.1 Structure and organization of the actin filaments.

7.2 Actin, myosin and cell movement

7.3 Intermediate filaments.

7.4 Microtubules.

7.5 Microtubular motors and movements.

### **Unit 8 Plasma membrane.**

8.1 The plasma membrane structure.

8.2 Transport of small molecules.

8.3 Endocytosis.

### **Unit 9. Cell walls, extracellular matrix and cellular interactions.**

9.1 Cell walls.

9.2 The extracellular matrix and cell interactions.

9.3 Interactions cell-cell.



## SECTION III: CELL REGULATION.

### **Unit 10. Cell signaling.**

- 10.1 Signaling Molecules and their receptors.
- 10.2 Functions of cell surface receptors.
- 10.3 Intracellular signal transduction pathways.
- 10.4 Transduction of signals and cytoskeleton.
- 10.5 Signalling networks.

### **Unit 11 Cell cycle.**

- 11.1 Eukaryotic cell cycle.
- 11.2 Regulators of cell cycle progression.
- 11.3 Events of phase M.
- 11.4 Meiosis and fertilisation.

### **Unit 12. Death and cell renewal.**

- 12.1 Programmed cell death.
- 12.2 Cells mother and maintenance of tissues adults.
- 12.3 Regenerative medicine: embryonic stem cell and therapeutic cloning.

### **Unit 13 Cancer.**

- 13.1 Development and causes of cancer.
- 13.2 Tumor virus.
- 13.3 Oncogenes.
- 13.4 Tumor suppressor genes.

## LABORATORY PRACTICES.

**1 & 2** Structure and management of the optical microscope.  
Preparation and observation of cells and cellular processes (mitosis).



## Temporary organization of learning:

Block of content	Number of sessions	Hours
SECTION I: INTRODUCTION	5,00	10,00
SECTION II: STRUCTURE AND FUNCTION OF CELLS.	10,25	20,50
SECTION III: CELL REGULATION.	9,00	18,00
LABORATORY PRACTICES.	2,00	4,00

## References

### FUNDAMENTAL BIBLIOGRAPHY

COOPER GM and HAUSMAN RE. "The cell". 6th Ed. Marbán 2014 (Or previous editions). ISBN: 9788471019479. Sections used in the subject: I – Introduction (except chapter 4), III – Structure and Function of Cells, IV – Cell Regulation. Animations, videos, and images of this book (in English) at <http://sites.sinauer.com/cooper6e/>

BRUCE ALBERTS, ALEXANDER JOHNSON, JULIAN LEWIS, DAVID MORGAN, MARTIN RAFF, KEITH ROBERTS, PETER WALTER. Molecular Biology of the Cell, 6th edition, Garland Science, November 2014 (Or previous editions in English and Spanish) .ISBN: 9780815344322; 9780815344643. Sections IV and V. Full text in English through searches for the 4th edition at: <http://www.ncbi.nlm.nih.gov/books/NBK21054/>

COOPER GM and HAUSMAN RE. "The cell" 7th Edition. Ed Marban (2017). ISBN: 978-84-16042-63-0

### FURTHER READING

BECKER WM, KLEINSMITH LJ, HARDIN J. "The world of the cell". 6th Edition. Editorial Pearson. 2007 Chapters 1 to 17 and 24.

BRUCE ALBERTS, DENNIS BRAY, KAREN HOPKIN, ALEXANDER JOHNSON, JULIAN LEWIS, MARTIN RAFF, KEITH ROBERTS, PETER WALTER. Introduction to Cell Biology. 3rd Edition. Editorial Médica Panamericana. 2010. Chapters 1 to 4, 11 to 18 and 20.