

## COURSE DETAILS

### "BIOCHEMISTRY"

#### SSD BIOCHIMICA (BIO/10) \*

\* the SSD (scientific disciplinary sector) should be the one that is mentioned in the "Didactic Regulation of the Degree Course" and not necessarily the one of the teacher. In case of an integrated course, the SSD (scientific disciplinary sector) should be written above only if all modules of the course belong to the same SSD, otherwise the SSD is to be written alongside the MODULE (see below).

DEGREE PROGRAMME: MEDICINE AND SURGERY (P11)

ACADEMIC YEAR 2023-2024

## GENERAL INFORMATION—TEACHER REFERENCES

COORDINATOR: ROMANO MARIA FIAMMETTA

PHONE: 081-7463125

EMAIL: [mariafiammetta.romano@unina.it](mailto:mariafiammetta.romano@unina.it)

Faculty	Position	Scientific Fields:	Phone 746-	Reception (day/time/building)	E-mail
Esposito Franca	Full Professor	Biochemistry	3145	Mon/Wed/15-18/Bldg.19A, 3 <sup>rd</sup> fl	<a href="mailto:franca.esposito@unina.it">franca.esposito@unina.it</a>
Pavone Luigi Michele	Full Professor	Biochemistry	3148	Thu 14-16 Bldg.19, 13 <sup>th</sup> floor	<a href="mailto:luigimichele.pavone@unina.it">luigimichele.pavone@unina.it</a>
Romano Maria Fiammetta	Full Professor	Biochemistry	3125	Tue 9.30-11.30 Bldg.19 Corpibassiusud 1 <sup>st</sup> floor	<a href="mailto:mariafiammetta.romano@unina.it">mariafiammetta.romano@unina.it</a>
Grosso Michela	Associate Professor	Biochemistry	4360/3140	Thu 14-16 Bldg.19A	<a href="mailto:michela.grosso@unina.it">michela.grosso@unina.it</a>
Matassa Danilo Swann	Associate Professor	Biochemistry	3139	Mon 9.00-11.00 Bldg.19A, 3 <sup>rd</sup> fl	<a href="mailto:daniiloswann.matassa@unina.it">daniiloswann.matassa@unina.it</a>
De Candia Paola	RTD-B	Biochemistry	4596	Wed 9.30-12.30 Bldg.19A, 2 <sup>nd</sup> fl	<a href="mailto:paola.decandia@unina.it">paola.decandia@unina.it</a>

## GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE (IF APPLICABLE): N/A

MODULE (IF APPLICABLE): N/A

SSD OF THE MODULE (IF APPLICABLE): BIO/10

TEACHING LANGUAGE: ENGLISH

CHANNEL (IF APPLICABLE): 01 SURNAME A-Z

YEAR OF THE DEGREE PROGRAMME (II):

SEMESTER (I, ANNUAL):

CFU: 9

### REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

none

### PREREQUISITES (IF APPLICABLE)

*For a correct understanding of the biochemical reactions that underlie biological processes, the student must be able to approach the chemical structure and reactivity of biomolecules.*

### LEARNING GOALS

*The course's educational objectives are to provide students with the fundamental concepts of the biochemical and molecular mechanisms of metabolism. Such a formative path intends to allow the student to elaborate on metabolic regulation. Another educational objective of the course is to introduce students to knowledge of metabolic defects and provide them with the essential methodological tools needed to analyze metabolic defects. The study is directly preparatory to Human Physiology and Systematic Pathology of Organ.*

### EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

#### Knowledge and understanding

*The student must demonstrate knowledge and understanding of the biochemical and molecular mechanisms of metabolism. He must demonstrate that she/he knows how to deal with even complex discussions on topics concerning metabolic regulation, starting from the notions learned on biochemical processes. She/he must also know the tools and basic methodologies needed to study metabolism and its defects.*

#### Applying knowledge and understanding

*The student needs to show the ability to apply the knowledge acquired on the main biochemical methods for solving problems concerning metabolism defects and its regulation and infer decisions on more suitable biochemical methodologies for the diagnosis/prevention of the main human diseases.*

## COURSE CONTENT/SYLLABUS

*Enzymes: classification; kinetic properties and parameters; enzymatic inhibition; regulatory enzymes. Water-soluble Vitamins and coenzymes. Principles of cellular metabolism and bioenergetic (0,75 CFU). Carbohydrate metabolism: glycolysis; gluconeogenesis; pentose phosphate pathway; disaccharides and glycogen; regulation. Citric acid cycle: reactions and regulation (1 CFU). Lipid metabolism: digestion and transport; oxidation of fatty acids; ketone bodies. Biosynthesis of fatty acids, triacylglycerols, membrane phospholipids, cholesterol; regulation. Fat-soluble vitamins (0,75 CFU). Protein metabolism: fate of amino groups and urea cycle; main degradation pathways and biosynthesis of amino acids (0,75 CFU). Nucleotide metabolism: de novo synthesis and salvage pathways; catabolism of purine and pyrimidine nucleotides (0,25 CFU). Oxygen transport: hemoglobin and myoglobin. Bioenergetic and electron transport mechanisms; oxidative phosphorylation. (0,75 CFU) Biochemistry of tumor cells. Reactive oxygen species and molecular basis of aging (0,5 CFU). Hormone biochemistry: the main endocrine systems. Peptide, thyroid, steroidal (gender differences), pancreatic hormones. (0,75 CFU) Integration of metabolism-tissue-specific metabolisms: liver, adipose tissue, muscle, nervous tissue (2, 5 CFU). Biochemistry of the blood and coagulation proteins. Iron and heme metabolisms (0,5 CFU). Main methodologies for the study of the biochemical/molecular bases of human pathologies: optical, chromatographic and electrophoretic techniques (1,5 CFU).*

SCHEDULE OF THE COURSE			
Week	Day time p.m. 3.30-5.10	Prof	Formal Lectures
1 <sup>st</sup> Oct 7 <sup>th</sup> -11 <sup>th</sup> , 2024	Mon, Oct 7 <sup>th</sup>	Romano	Introduction
	Tue, Oct 8 <sup>th</sup>	Pavone	Key principles of enzyme structure, kinetics, and regulation
	Wed, Oct 9 <sup>th</sup>	Pavone	
	Thu, Oct 10 <sup>th</sup>	Pavone	
	Fri, Oct 11 <sup>th</sup>	Pavone	Introduction to metabolism
2 <sup>nd</sup> Oct 14 <sup>th</sup> -18 <sup>th</sup> , 2024	Mon, Oct 14 <sup>th</sup>	Grosso	Thermodynamics/bioenergetics (principles)
	Tue, Oct 15 <sup>th</sup>	Romano	Structural/biological features of the most relevant proteins of biomedical interest
	Wed, Oct 16 <sup>th</sup>	Romano	
	Thu, Oct 17 <sup>th</sup>	Esposito	Molecular mechanisms of signal transduction; hormone receptors
	Fri, Oct 18 <sup>th</sup>	Esposito	
3 <sup>rd</sup> Oct 21 <sup>st</sup> -25 <sup>th</sup> 2024	Mon Oct 21 <sup>st</sup>	Grosso	Catabolism and anabolism of carbohydrates and regulation
	Tue, Oct 22 <sup>nd</sup>	Grosso	
	Wed, Oct 23 <sup>rd</sup>	Grosso	
	Thu, Oct 24 <sup>th</sup>	Grosso	
	Fri, Oct 25 <sup>th</sup>	Grosso	
4 <sup>th</sup> Oct 28 <sup>th</sup> - Oct 31 <sup>st</sup> , 2024	Mon, Oct 28 <sup>th</sup>	Esposito	Catabolism of lipids and regulation
	Tue, Oct 29 <sup>th</sup>	Esposito	Anabolism of lipids and regulation
	Thu, Oct 30 <sup>th</sup>	Matassa	
	Fri, Oct 31 <sup>st</sup>	Matassa	
5 <sup>th</sup> Nov 4 <sup>th</sup> -8 <sup>th</sup> , 2024	Mon, Nov 4 <sup>th</sup>	Esposito	Integration and regulation of metabolism
	Tue, Nov 5 <sup>th</sup>	Matassa	Heme metabolism
	Wed, Nov 6 <sup>th</sup>	DeCandia	Respiratory chain and oxidative phosphorylation. Reactive oxygen species
	Thu, Nov 7 <sup>th</sup>	DeCandia	
	Fri, Nov 8 <sup>th</sup>	DeCandia	

6 <sup>th</sup> Nov 11 <sup>th</sup> -15 <sup>th</sup> , 2024	Mon, Nov 11 <sup>th</sup> Tue, Nov 12 <sup>th</sup> Wed, Nov 13 <sup>th</sup> Thu, Nov 14 <sup>th</sup>  Fri, Nov 15 <sup>th</sup>	Romano Romano Romano Romano  Pavone	Catabolism and anabolism of amino acids and regulation    Catabolism and anabolism of nucleotides and regulation
7 <sup>th</sup> Nov 18 <sup>th</sup> -22 <sup>nd</sup> , 2024	Mon, Nov 18 <sup>th</sup>  Tue, Nov 19 <sup>th</sup>  Wed, Nov 20 <sup>th</sup> Thu, Nov 21 <sup>st</sup>  Fri, Nov 22 <sup>nd</sup>	Pavone  Matassa  Matassa Matassa  Romano	Catabolism and anabolism of amino acids and regulation  Evaluation test  Cancer metabolism  Hormones and hormonal regulation of metabolism
8 <sup>th</sup> Nov 25 <sup>th</sup> - Nov 29 <sup>th</sup> , 2024	Mon, Nov 25 <sup>th</sup> Tue, Nov 26 <sup>th</sup> Wed, Nov 27 <sup>th</sup>  Thu, Nov 28 <sup>th</sup> Thu, Nov 29 <sup>th</sup>	Romano Romano Romano  Pavone Pavone	Hormones and hormonal regulation of metabolism    Tissue/organ-specific metabolism : Liver
9 <sup>th</sup> Dec 2 <sup>nd</sup> - 6 <sup>th</sup> , 2024	Mon, Dec 2 <sup>nd</sup> Tue, Dec 3 <sup>rd</sup>  Wed, Dec 4 <sup>th</sup>  Thu, Dec 5 <sup>th</sup> Fri, Dec 6 <sup>th</sup>	Grosso Grosso  Romano  Esposito Esposito	Tissue/organ-specific metabolism: Adipose tissue-Obesity  Tissue/organ-specific metabolism : Muscle  Tissue/organ-specific metabolism: Brain
10 <sup>th</sup> Dec 9 <sup>th</sup> - 13 <sup>th</sup> , 2024	Mon, Dec 9 <sup>th</sup> Tue, Dec 10 <sup>th</sup>  Wed, Dec 11 <sup>th</sup> Thu, Dec 12 <sup>th</sup>  Fri, Dec 13 <sup>th</sup>	DeCandia DeCandia  Matassa Matassa  DeCandia	Tissue/organ-specific metabolism: Blood/coagulation  Basic principles of methodologies  Evaluation test

## READINGS/BIBLIOGRAPHY

- Lehninger Principles of Biochemistry, Cox M.M and Nelson D.L. 8th ed
- Biochemistry- Jeremy M. Berg, John L. Tymoczko, Lubert Stryer, 10th ed.
- Medical Biochemistry- John Baynes PhD e Marek H. Dominiczak MD Dr Hab Med FRCPath with STUDENT CONSULT Online Access, (Medial Biochemistry) 2014, 4 ed
- Medical Biochemistry- Baghavan N.V. 4th ed

## TEACHING METHODS

For the teaching of Human Biochemistry, frontal lectures (80%, interactive didactic activity in small groups (ADI) (10%) are provided, self-evaluation test (10%)  
Tools for teaching delivery (multimedia, online material).

## EXAMINATION/EVALUATION CRITERIA

For **integrated courses**, this field should encompass all modules, with indication of the relative weight of each module on the final mark. For integrated courses, this field should be coordinated by the reference teacher for the course.

**a) Examtype:**

For **integrated courses**, there should be one exam.

Examtype	
writtenandoral	X
onlywritten	
onlyoral	
project discussion	
other	

In case of a written exam, questions refer to: (*)	Multiple choiceanswers	X
	Open answers	
	Numericalexercises	

(\*) multiple options are possible

**b) Evaluation pattern:**

Individual assessment will be based on a written questionnaire and an oral presentation of the topics of the lessons (with final mark 18-30/30). - Students must pass the written test (with a mark  $\geq 18/30$ )