

SYLLABUS OF MATTER

ADVANCED IMMUNOLOGY

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: MESSAOUDI DALILA				
Email	messaoudidalila@yahoo.fr	Reception day	Sunday Monday	Hour	13-16h
Office phone N°	_____	Building	SNV	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UEF1
Objective	Deepen the fundamental bases of modern immunology and prepare students for further specialization, presenting the immune system as an integrated network while covering the discipline's core concepts.
Prerequisites	Basic notions of immunology.
Short content	• General organization and compartmentalization of the immune system • Innate and acquired immunity – reminders • Inflammatory reactions; Toll-like receptors (TLR): structure, role and function • Mucosal immune system • MHC molecule structure and antigen presentation • T-cell repertoire selection, differentiation and ontogenesis • Cellular cooperation in immune responses (APC/T cells, T/B cells) • B-lymphocyte maturation mechanisms • Lymphocyte activation and signal transduction (TCR/BCR) • Immunology of pregnancy (feto-maternal tolerance) • Immune system ageing; immune regulation • Apoptosis in immune homeostasis; immuno-endocrine interactions
Subject Credits	6
Matter Coefficient	3
Weekly Hourly Volume (VHH)	06h00
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 03h00 Tutorial: 01h30 Lab work: 00h00
Semester Hourly Volume (VHS)	67h30
Personal Work Hours	82h30
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination.

Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED	
Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Not applicable (no scheduled laboratory sessions).
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Not applicable.

EXPECTATIONS	
Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY	
• Collège des Enseignants d'Immunologie (ASSIM), Immunologie fondamentale et immunopathologie, Elsevier Masson, 3rd ed., 2022. • Abbas A.K., Lichtman A.H., Pillai S., Cellular and Molecular Immunology, Elsevier Masson, 7th ed., 2024. • Rabhi H., Manuel d'immunologie, OPU, 3rd ed., 2001. • ASSIM, Guide des analyses en immunologie, Elsevier Masson, 2nd ed., 2020.	

SYLLABUS OF MATTER

GENES AND MOLECULES OF IMMUNITY

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: HOUCHER ZAHIRA				
Email	houcherz@yahoo.fr	Reception day	Tuesday Wednesday	Hour	13-16h
Office phone N°	_____	Building	FSNV	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UEF1
Objective	Study the structure of MHC genes and their polymorphism, TCR and BCR genes, and antigen-antibody relationships. Detailed study of the molecules of immunity (complement, cytokines and their receptors, chemokines and their receptors, innate-immunity receptors) and TCR signal transduction.
Prerequisites	Immunology, molecular biology, biochemistry.
Short content	• Major Histocompatibility Complex (MHC): gene structure and polymorphism • Immunoglobulins: structure and genes • Complement and inhibitors: mechanisms and regulation • T-cell receptor: structure and genes • Adhesion molecules and cellular activation • Cytokines and cytokine receptors • Chemokines and chemokine receptors • Innate immunity receptors (PRRs)
Subject Credits	6
Matter Coefficient	3
Weekly Hourly Volume (VHH)	06h00
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 03h00 Tutorial: 01h30 Lab work: 00h00
Semester Hourly Volume (VHS)	67h30
Personal Work Hours	82h30
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.

Second knowledge check	Date / duration / type: to be announced by the teacher.
-------------------------------	---

EQUIPMENT AND MATERIALS USED	
Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Not applicable (no scheduled laboratory sessions).
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Not applicable.

EXPECTATIONS	
Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY	
• Bouillon M., Mourad W.M., « Complexe majeur d'histocompatibilité de classe II », médecine/sciences, 2003. • Atlas d'immunologie, Cairn.info – chapter on MHC and antigen presentation. • Faculty of Medicine of Constantine course notes on the MHC.	

SYLLABUS OF MATTER

CELL COMMUNICATION AND SIGNALING

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: THORIA GUEMEZ				
Email	thoriaguem@yahoo.fr	Reception day	Monday Wednesday	Hour	9-15h
Office phone N°	_____	Building	FSNV	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UEF2
Objective	Provide students with a global view of cell signaling, an essential base for the specialties of Cell Biology & Development, Biochemistry, Immunology or Genetics, and a foundation for modern approaches to Physiology, Neurobiology and related pathologies.
Prerequisites	Cell biology, biochemistry.
Short content	• Membrane receptors: hormone receptors, growth-factor/cytokine receptors, antigen-specific receptors, apoptosis receptors • Mechanisms of cell transduction triggered by receptors • Cell adhesion and juxtacrine interactions in tissue formation, elasticity and repair • Multiple/complex signaling cascades and cross-talk between pathways • Practical work: label-free techniques (precipitation, agglutination, complement reactions, neutralization) and labelled techniques (immunofluorescence, radio-immunology/enzymology), test sensitivity
Subject Credits	6
Matter Coefficient	3
Weekly Hourly Volume (VHH)	06h00
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 03h00 Tutorial: 01h30 Lab work: 00h00
Semester Hourly Volume (VHS)	67h30
Personal Work Hours	82h30
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED	
Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Not applicable (no scheduled laboratory sessions).
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Not applicable.

EXPECTATIONS	
Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY	
• Practical handouts on antigen recognition, signaling and cellular activation. • University course material on cell signaling, adhesion and transduction cascades. • Reference textbooks in fundamental and cellular immunology.	

SYLLABUS OF MATTER

PHYSICOCHEMISTRY OF BIOLOGICAL MACROMOLECULES

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: LOUIZA OUKSEL				
Email	louksel2014@gmail.com	Reception day	Tuesday Wednesday	Hour	11-15h
Office phone N°	_____	Building	_____	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UEM
Objective	Present technical means to study biological macromolecules based on physicochemical properties and modelling approaches, with emphasis on qualitative and quantitative analysis of spectroscopic data and computational tools for sequence and 3-D structure analysis of proteins.
Prerequisites	Analytical techniques, biochemistry, basic physics.
Short content	- Biochemical and hydrodynamic approaches: protein folding and conformational stability, disulfide bonds, hydrodynamic properties, chemical modifications - Spectroscopy: absorption, fluorescence/luminescence, NMR - Crystallography and diffusion - Notions of computing and programming; overview of modelling domains - Study of interaction properties of biological macromolecules - Practical work: UV-Visible spectroscopy, fluorescence spectroscopy, infrared spectroscopy, lipid analysis
Subject Credits	5
Matter Coefficient	3
Weekly Hourly Volume (VHH)	03h00
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 01h30 Tutorial: 00h00 Lab work: 02h30
Semester Hourly Volume (VHS)	60h00
Personal Work Hours	55h00
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination, practical-work examination.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED

Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Equipment of the Techniques d'Analyse / Biochimie / Physiologie Animale teaching laboratories (spectrophotometers, centrifuges, electrophoresis units, microscopes, etc.), as listed in the master's equipment file.
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Lab coat, gloves, safety glasses as required for practical sessions.

EXPECTATIONS

Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY

• Cuq M., Biochimie des Protéines, Académie des Sciences Lettres Montpellier, 2018. • JoVE (2025), protocol on protein-protein interaction measurement by NMR and MST. • "Déterminer la structure d'une protéine par RMN", L'Actualité Chimique, 2012.
--

SYLLABUS OF MATTER

PRODUCTION OF RECOMBINANT PROTEINS

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: HOCINE BADACHE				
Email	hocine.badache@univ-setif.dz	Reception day	Monday Wednesday	Hour	10-14h
Office phone N°	_____	Building	FSNV	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UEM
Objective	Provide an overview of the different systems available for recombinant-protein production, their advantages and limits, enabling a reasoned choice of the most suitable system for a given objective, including optimisation of expression and nickel-column purification.
Prerequisites	Molecular biology and genetic manipulation; basic microbiology and protein purification/analysis techniques.
Short content	• Transcription and translation reminders (bacteria, eukaryotes, viruses) • Objectives of heterologous protein production; cloning, primer design and vector analysis • Bacterial expression systems (E. coli): strain construction, induction systems, purification, optimisation • Cloning strategies; comparison of expression systems • Production in S. cerevisiae and P. pastoris • Production in insect and animal cells; production in metazoan organisms • Practical work: antibiotic-screening techniques, strain conservation, protein/enzyme production
Subject Credits	4
Matter Coefficient	2
Weekly Hourly Volume (VHH)	03h00
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 01h30 Tutorial: 01h30 Lab work: 00h00
Semester Hourly Volume (VHS)	45h00
Personal Work Hours	65h00
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination, oral presentations, protein-sequence analysis.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).

First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED

Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Not applicable (no scheduled laboratory sessions).
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Not applicable.

EXPECTATIONS

Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY

- Alberts B. et al., Molecular Biology of the Cell, 6th ed., De Boeck Supérieur, 2015.
- ProteoGenix, Guide complet sur la production de protéines recombinantes, 2023.
- Sambrook J., Russell D., Molecular Cloning, De Boeck Supérieur, 2012.

SYLLABUS OF MATTER

FREE AND OPEN-SOURCE SOFTWARE

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: BELLA F				
Email	nourbela97@gmail.com	Reception day	Wednesday	Hour	13-16h
Office phone N°	_____	Building	_____	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UED
Objective	Deepen the use of open-source software for research in natural and life sciences, develop advanced data-management/analysis skills, design open-science projects in biology and ecology, and train on open, collaborative scientific tools.
Prerequisites	Introductory free/open-source software and programming.
Short content	• Open science and advanced data management: reproducibility, open data formats, Git/GitHub workflow • Advanced programming and automation: Bash scripting, NumPy/Pandas/Seaborn • Open-source tools in biology: Biopython, EMBOSS, phylogenetic-tree visualisation, COPASI, CellDesigner, Galaxy, R • Applications: image analysis (ImageJ/Fiji), systems modelling, project writing (LibreOffice/Zotero/Git), mapping (QGIS/Zenodo) • Practical work: collaborative open-science workflow, QGIS data analysis, open-science mini-project
Subject Credits	1
Matter Coefficient	1
Weekly Hourly Volume (VHH)	01h30
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 01h00 Tutorial: 00h00 Lab work: 00h30
Semester Hourly Volume (VHS)	22h30
Personal Work Hours	02h30
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Continuous assessment (40%) and semester examination (60%).
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.

Second knowledge check	Date / duration / type: to be announced by the teacher.
-------------------------------	---

EQUIPMENT AND MATERIALS USED

Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Equipment of the Techniques d'Analyse / Biochimie / Physiologie Animale teaching laboratories (spectrophotometers, centrifuges, electrophoresis units, microscopes, etc.), as listed in the master's equipment file.
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Lab coat, gloves, safety glasses as required for practical sessions.

EXPECTATIONS

Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY

• Berman J., Korman A., Data Science for the Open World, O'Reilly, 2021. • McKinney W., Python for Data Analysis, 3rd ed., O'Reilly, 2020. • He W., Liu Z., Open Source Software for Bioinformatics, Wiley, 2022.	
---	--

SYLLABUS OF MATTER

BIOETHICS IN BIOMEDICAL RESEARCH

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: HANIFA DJELLILI				
Email	hdhanifadj@gmail.com	Reception day	Monday Tuesday	Hour	10-13h
Office phone N°	_____	Building	_____	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UED
Objective	Familiarise students with the origins of bioethics and elements of deontology in animal experimentation and in diagnostic, therapeutic and stem-cell research manipulations.
Prerequisites	None.
Short content	• Origins of bioethics • Elements of researcher deontology • Bioethics of embryonic stem-cell manipulation, gene therapy, reproductive/therapeutic cloning, vaccine production, transplantation and GMOs • Ethics of genetic diagnosis and respect for intellectual property • Prevention of laboratory-related risks
Subject Credits	1
Matter Coefficient	1
Weekly Hourly Volume (VHH)	01h30
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 01h00 Tutorial: 00h00 Lab work: 00h30
Semester Hourly Volume (VHS)	22h30
Personal Work Hours	02h30
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Written examination.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED

Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Equipment of the Techniques d'Analyse / Biochimie / Physiologie Animale teaching laboratories (spectrophotometers, centrifuges, electrophoresis units, microscopes, etc.), as listed in the master's equipment file.
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Lab coat, gloves, safety glasses as required for practical sessions.

EXPECTATIONS	
Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY	
• Boné D., « Les trois générations de la bioéthique », Revue théologique de Louvain, 1993. • Girard D., « La bioéthique », ATTAC 92, 2013.	

SYLLABUS OF MATTER

COMMUNICATION

MASTER COURSE	Academic Master – Applied Immunology (Biological Sciences) — Semester 1				
TEACHER	Name and surname: HOUCHER ZAHIRA				
Email	houcherz@yahoo.fr	Reception day	Tuesday Wednesday	Hour	13-16h
Office phone N°	_____	Building	_____	Office	_____

COURSE DESCRIPTION	
Unit Teaching Type	UET
Objective	Develop students' mastery of ICT infrastructures and tools, optimise data processing and scientific innovation, and support effective research in natural and life sciences.
Prerequisites	None.
Short content	• Fundamentals and challenges of ICT, communication and documentary research • Network infrastructures and communication security • Information-processing tools and methods (databases, data science/AI, cloud computing) • Written scientific communication (professional emails, CVs, IMRaD articles, referencing) • Oral communication and multimedia supports • Specific applications, innovation and ethical issues (telemedicine, scientific integrity, plagiarism)
Subject Credits	1
Matter Coefficient	1
Weekly Hourly Volume (VHH)	01h30
Lecture / Tutorial / Lab (Cours/TD/TP)	Lecture: 01h30 Tutorial: 00h00 Lab work: 00h00
Semester Hourly Volume (VHS)	22h30
Personal Work Hours	00h00
Targeted skills	Mastery of the concepts and techniques listed in the short content; ability to analyse, synthesise and communicate scientific results in the field of Applied Immunology.

EVALUATION OF KNOWLEDGE	
Mode of evaluation	Semester examination (100%), in-person.
Continuous assessment weighting	As defined by the teaching team at the start of the semester (typically $\geq 40\%$ for UED/UET units).
First knowledge check	Date / duration / type: to be announced by the teacher.
Second knowledge check	Date / duration / type: to be announced by the teacher.

EQUIPMENT AND MATERIALS USED	
Handouts	Lecture notes (polycopiés), slide decks and scientific articles provided by the teacher.
Laboratory materials	Not applicable (no scheduled laboratory sessions).
Application names	Departmental e-learning platform / university digital workspace (as communicated by the teacher).
Protective materials	Not applicable.

EXPECTATIONS	
Expected of students	Regular attendance, active participation, completion of assigned readings/exercises and punctual submission of practical-work reports.
Teacher expectations	Timely delivery of the course content, availability during reception hours, and clear communication of evaluation criteria at the start of the semester.

BIBLIOGRAPHY	
• Braunschweig P., Saldaña A., Technologies de l'information et de la communication en sciences, 2020. • Jenkins H., Green M., Understanding Digital Communication in the Scientific World, Oxford Univ. Press, 2021. • Smith R.J., Williams M., Cryptography and Network Security, Wiley, 2023.	