Université de Toulouse

Faculté sciences et ingénierie Université de Toulouse

PÉRIODE D'ACCRÉDITATION : 2022 / 2026

UNIVERSITE DE TOULOUSE

SYLLABUS MASTER

Mention Biotechnologies

M2 Biomolecular Sciences : Mechanisms and Therapeutic Targets

http://www.fsi.univ-tlse3.fr/
http://www.mbbt.ups-tlse.fr/

2026 / 2027

26 NOVEMBRE 2026

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PRESENTATION OF THE DISCIPLINE

DISCIPLINE BIOTECHNOLOGIES

L'objectif du master Biotechnologies est la maîtrise des fondamentaux scientifiques et techniques dans le domaine de la biochimie, des biotechnologies et de la microbiologie .
Nous voulons : i) permettre aux étudiants d'acquérir des connaissances concernant le décryptage des mécanismes moléculaires du vivant, ii) faire d'eux des scientifiques capables de maîtriser les concepts et les outils nécessaires à l'exploitation des développements récents dans les domaines de la biochimie, de la biologie moléculaire et de la microbiologie, iii) les former à l'expérimentation en laboratoire dans les domaines concernés, iv) leur apprendre à communiquer et à transmettre leurs connaissances, et v) exercer leur esprit critique.
Il s'agit d'un enseignement large abordant, aux niveaux moléculaire et supramoléculaire, les structures, les mécanismes d'action et l'évolution du vivant, et notre capacité à intervenir sur son fonctionnement dans des conditions normales ou pathologiques. La conception de molécules destinées à la pharmacologie ou la thérapeutique et le développement de stratégies innovantes dans le domaine des biotechnologies est un puissant thème fédérateur des enseignements de la mention.

PRESENTATION OF THE YEAR OF M2 BIOMOLECULAR SCIENCES : MECHANISMS AND THERAPEUTIC TARGETS

CONTACTS SECTION

CONTACT INFORMATION CONCERNING THE SPECIALTY

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CONTACT INFORMATION CONCERNING THE DISCIPLINE

PERSON IN CHARGE OF THE DISCIPLINE BIOTECHNOLOGIES

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TABLE SUMMARIZING THE MODULES THAT MAKE UP THE TRAINING PROGRAM

page	Code	Title of the module	semestre*	ECTS	Mandatory Optional	Cours	Seminaire	TD	TP	Stage*
First semester										
11	KBTB9ADU	SCIENTIFIC ANALYSIS AND COMMUNICATION (ScAnal&Comm)	I	6	O			60		
13	KBTB9AFU	THEMATIC WORKSHOP	I	9	O			80		
	KBTB9AAU	OUVERTURE : INTERNATIONAL, BIOÉTHIQUE, INSERTION PROF.	I	3	O					
8	KBTX9AA1	Ouverture : international, bioéthique, insertion professionnelle				6		12	4	
10	KBTX9AA2	Ouverture : international, bioéthique, insertion professionnelle					6			
12	KBTB9AEU	TECHNOLOGICAL WORKSHOP	I	12	O			120		
Second semester										
14	KBTBAAAU	STAGE (Internship)	II	30	O					12

* **AN** :year long teaching, **I** : first semester, **II** : second semester

***Stage**: in number of months

LIST OF THE MODULES

UE	OUVERTURE : INTERNATIONAL, BIOÉTHIQUE, INSERTION PROF.	3 ECTS	1st semester
Sous UE	Ouverture : international, bioéthique, insertion professionnelle		
KBTX9AA1	Cours : 6h , TD : 12h , TP : 4h	Teaching in anglais	Personal work 47 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

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LEARNING GOALS

Les objectifs de cette UE sont, d'une part, ouvrir l'esprit des futurs diplômés à des notions qui ne sont pas leur cœur disciplinaire et, d'autre part, développer les compétences transversales nécessaires à une insertion professionnelle réussie.

SUMMARY OF THE CONTENT

Les notions suivantes seront abordées à la fois sous forme d'enseignements traditionnels et de séminaires, y compris par des conférenciers internationaux :

- la bioéthique (en particulier nos droits et devoirs envers les organismes vivants, y compris les plus simples, le rapport du scientifique au public) ;
- intelligence artificielle : pouvoir et limites (notamment en matière d'éthique) ;
- les avancées plus récentes dans le domaine des nanobiotechnologies : bases, concepts, applications.

Enfin, en vue de leur insertion professionnelle, des tables rondes seront organisées avec d'anciens diplômés du Master, recrutés dans le monde académique ou dans le secteur privé : recherche d'emploi, stratégies de candidature, intégration, mise en réseau. Les étudiants seront interpellés à la fois par un questionnement personnel sur leurs objectifs professionnels et par des entretiens d'embauche fictifs.

SPECIFICITIES

For the "Biomolecular Science : Mechanisms and Therapeutic Targets" (BSM2T) course, lectures and practical work will be taught in English.

LEARNING OBJECTIVES :
The objectives of this course are, on the one hand, to open the minds of future graduates to notions besides their disciplinary core and, on the other hand, to develop the transversal skills necessary for their successful professional integration.
SUMMARY OF THE CONTENT : The following concepts will be covered both as traditional teachings and as seminars, including international lecturers :
compris par des conférenciers internationaux :

- bio-ethics (in particular our rights and duties towards living organisms, including the simplest ones, the relationship of the scientist to the public) ;
- artificial intelligence : power and limits (in particular regarding ethics) ;
- the most recent advances in the field of nanobiotechnology : concepts, basics, applications.

Finally, with a view to their professional integration, round tables will be organized with former Masters graduates, recruited in the academic world or in the private sector : job search, application strategies, integration, networking. Students will be challenged both through self-questioning on their professional goals, and fictive job interviews.

TARGETED SKILLS

S'insérer professionnellement dans une entreprise
Comprendre l'Anglais scientifique à l'oral
Respecter la bio-éthique et l'éthique scientifique

KEYWORDS
Insertion professionnelle, entreprise, éthique

UE	OUVERTURE : INTERNATIONAL, BIOÉTHIQUE, INSERTION PROF.	3 ECTS	1st semester
Sous UE	Ouverture : international, bioéthique, insertion professionnelle		
KBTX9AA2	Séminaire : 6h	Teaching in anglais	Personal work 47 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

POUPOT Remy
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LEARNING GOALS

Les objectifs de cette UE sont, d'une part, ouvrir l'esprit des futurs diplômés à des notions qui ne sont pas leur cœur disciplinaire et, d'autre part, développer les compétences transversales nécessaires à une insertion professionnelle réussie.

SUMMARY OF THE CONTENT

Les notions suivantes seront abordées à la fois sous forme d'enseignements traditionnels et de séminaires, y compris par des conférenciers internationaux :

- la bioéthique (en particulier nos droits et devoirs envers les organismes vivants, y compris les plus simples, le rapport du scientifique au public) ;
- intelligence artificielle : pouvoir et limites (notamment en matière d'éthique) ;
- les avancées les plus récentes dans le domaine des nanobiotechnologies : bases, concepts, applications.

Enfin, en vue de leur insertion professionnelle, des tables rondes seront organisées avec d'anciens diplômés du Master, recrutés dans le monde académique ou dans le secteur privé : recherche d'emploi, stratégies de candidature, intégration, mise en réseau. Les étudiants seront interpellés à la fois par un questionnement personnel sur leurs objectifs professionnels et par des entretiens d'embauche fictifs.

TARGETED SKILLS

S'insérer professionnellement dans une entreprise
Comprendre l'Anglais scientifique à l'oral
Respecter la bio-éthique et l'éthique scientifique

REFERENCES

Insertion professionnelle, entreprise, éthique

UE	SCIENTIFIC ANALYSIS AND COMMUNICATION (ScAnal&Comm)	6 ECTS	1st semester
KBTB9ADU	TD : 60h	Teaching in anglais	Personal work 90 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

NIETO Laurence
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LEARNING GOALS

LEARNING GOALS : This interdisciplinary course will allow students to strengthen their ability to critically analyze scientific articles and develop their knowledge for written and oral scientific communication. They will also develop skills in argumentation, listening and constructive dialogue, and confidence in contributing in discussions.

SUMMARY OF THE CONTENT

COURSE DESCRIPTION : The course will be based on recent publications concerning 3 major scientific topics like, for instance, Cancer, Aging or infectious diseases. Each student will have to study proposed scientific articles and to critically analyze their contents through two different and important means of communication in sciences, one for a written restitution (highlight of an article) and one for an oral presentation (poster session). They will work by groups, but with an individual evaluation.The ability of students to argue, inform, explain, convince, will be particularly important.

PREREQUISITES

PREREQUISITE(S) : Traditional use of software for oral and written presentation.

SPECIFICITIES

All lectures and exams will be provided in English language.

KEYWORDS

KEY WORDS : Critical analysis, scientific communication, defend one's point of view

UE	TECHNOLOGICAL WORKSHOP	12 ECTS	1st semester
KBTB9AEU	TD : 120h	Teaching in anglais	Personal work 180 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

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UE	THEMATIC WORKSHOP	9 ECTS	1st semester
KBTB9AFU	TD : 80h	Teaching in anglais	Personal work 145 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

BOUSQUET Marie-Pierre
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UE	STAGE (Internship)	30 ECTS	2nd semester
KBTBAAAU	Stage : 14 mois	Teaching in anglais	Personal work 750 h

[Retour liste des UE]

TEACHER IN CHARGE OF THE MODULE

NIETO Laurence
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BOUSQUET Marie-Pierre
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LEARNING GOALS

LEARNING GOALS : Half of the year of Master 2 BSM2T will be dedicated to an internship in order to broaden the practical scope of the training in a professional context. The internship could be performed either in a public lab or in an industry, in France or abroad. In all cases, the objective is to participate in a scientific project, either by taking part in a research program or by contributing to a technological development using innovative instruments dedicated to structural biochemistry. A set of internship projects with partner laboratories will be offered but students can also look for new opportunities either in academic research labs, public technological platforms or in industry, as long as the content of the project fits the objectives of the Master 2's degree.

SUMMARY OF THE CONTENT

COURSE DESCRIPTION : Students will participate in a scientific project, by taking part in a research program or by contributing to a technological development using innovative instruments devoted to structural biochemistry or biochemical -omic approaches (metabolomics or proteomics). The internship could take place either in a public lab or in a company, in France or abroad. Before the beginning of the internship, a bibliographic research will be conducted and presented to understand the scientific and technological contexts of the projects as well as the strategies. At the end of the training, students will have to present their projects and their results through a written report and an oral presentation.

PREREQUISITES

PREREQUISITE Students should have attended the courses of the first semester to provide the required level to conduct the internship project.

SPECIFICITIES

All lectures and exams will be provided in English language.

KEYWORDS

KEY-WORDS Laboratory, Academy, Technological Platform, Industry, Scientific project

GLOSSARY

GENERAL TERMS

DEPARTMENT

The departments are teaching structures within components (or faculties). They group together teachers lecturing in one or more disciplines.

MODULE

A semester is structured into modules that may be mandatory, elective (when there is a choice) or optional (extra). A module corresponds to a coherent teaching unit whose sucessful completion leads to the award of ECTS credits.

ECTS: EUROPEAN CREDITS TRANSFER SYSTEM

The ECTS is a common unit of measure of undergraduate and postgraduate university courses within Europe, created in 1989. Each validated module is thus assigned a certain number of of ECTS (30 per teaching semester). The number of ECTS depends on the total workload (lectures, tutorials, practicals, etc.) including individual work. The ECTS system aims to facilitate student mobility as well as the recognition of degrees throughout Europe.

TERMS ASSOCIATED WITH DEGREES

Degrees have associated domains, disciplines and specialities.

DOMAIN

The domain corresponds to a set of degrees from the same scientific or professional field. Most of our degrees correspond to the domain Science, Technology and Health.

DISCIPLINE

The discipline corresponds to a branch of knowledge. Most of the time a discipline consists of several specialities.

SPECIALITY

The speciality constitutes a particular thematic orientation of a discipline chosen by a student and organised as a specific trajectory with specialised modules.

TERMS ASSOCIATED WITH TEACHING

LECTURES

Lectures given to a large group of students (for instance all students of the same year group) in lecture theatres. Apart from the presence of a large number of students, lectures are characterized by the fact they are given by a teacher who defines the structure and the teaching method. Although its content is the result of a collaboration between the teacher and the rest of the educational team, each lecture reflects the view of the teacher giving it.

TD : TUTORIALS

Tutorials are work sessions in smaller groups (from 25 to 40 students depending on the department) led by a teacher. They illustrate the lectures and allow students to explore the topics deeper.

TP : PRACTICALS

Teaching methods allowing the students to acquire hands-on experience concerning the knowledge learned during lectures and tutorials, achieved through experiments. Practical classes are composed of 16 to 20 students. Some practicals may be partially supervised or unsupervised. On the other hand, certain practicals, for safety reasons, need to be closely supervised (up to one teacher for four students).

PROJECT

A project involves putting into practice in an autonomous or semi-autonomous way knowledge acquired by the student at the university. It allows the verification of the acquisition of competences.

FIELD CLASS

Field classes are a supervised teaching method consisting of putting into practice knowledge acquired outside of the university.

INTERNSHIPS

Internships are opportunities enabling students to enrich their education with hands-on experience and to apply lessons learned in the classroom to professional settings, either in industry or in research laboratories. Internships are strongly regulated and the law requires, in particular, a formal internship convention established between the student, the hosting structure and the university.


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