

# MASTER IN BIOINFORMATICS (2024-2025)

## ISDD Research Track: Macromolecule Modeling

### SEMESTER 1 - Université Paris Diderot (30 ECTS)

#### Refresher course (A-C. Camproux)

BQAAY000 Unix and R basics (Upgrade) (G. Moroy)

#### Fundamentals (7 ECTS) (C. Etchebest)

BQAAY210 Biochemistry (C. Etchebest, N. Caulet, F. Rodrigues-Lima) (4 ECTS)

BQAAY020 Biostatistics and R programming (L. Regad) (3 ECTS)

Or according to level

BQAAY030 Tutored project in biostatistics and R (A-C Camproux & A. Badel) (3 ECTS)

#### Programming and mathematical tools (9 ECTS) (J.C Gelly & A. Badel) (3 EC depending on level)

BQ2AY040 Mathematics I (A-C Camproux) (3 ECTS)

BQAAY060 Optimization and learning in biology (D. Flatters, F. Guyon) (3 ECTS)

BQAAY070 Python programming 1 (P. Fuchs & P. Poulain) (3 ECTS)

BQAAY080 Python 2 programming (P. Fuchs & P. Poulain) (3 ECTS)

BQAAY090 Algorithmics 1 (C. Delporte, H. Fauconnier) (3 ECTS)

BQ2AC060 ECUE in M1 BI-UE2 (3 ECTS)

#### Practice and in-depth studies (8 ECTS) (V. Gruber) (3 EC to choose from)

BM0BY250 ReSO Chemistry (Reactivity and Organic Synthesis) (F. Chau) (3 ECTS)

TX1CY090 Basic Toxicology (A. Baeza) (3 ECTS)

BQ2AE140 ADME/chemometry (O. Taboureau) (2 ECTS)

Or

BQ2AU150 English (2 ECTS)

#### Thematic orientation I (6 ECTS) (O. Taboureau & D. Flatters) (2 EC to choose from)

BQ2AE160 Chemoinformatics (J. Diharce & V.K. Tran Nguyen) (3 ECTS)

BQ2AE170 Chemistry: chirality - non-covalent bonds (F. Maurel, O. Taboureau) (3 ECTS)

BQ2AY180 Drug Design Option (O. Taboureau) (3 ECTS)

**SEMESTER 2 - Université Paris Diderot (30 ECTS)**

**Advanced fundamentals (6 ECTS) (A-C. Camproux)**

**BQABY010** : Massive data analysis (A-C. Camproux, A. Badel) (3 ECTS)

**BQABY020**: Biophysical approaches to the study of interactions (V. Gruber & W. Majeran) (3 ECTS)

**Thematic orientation II (18 ECTS) (G. Moroy & O. Taboureau)**

**BQ2BY030** Protein-Protein Docking \* course in English (A-C. Camproux, O. Taboureau) (3 ECTS)

**BQ2BY040** Introduction to Drug Design In Silico (G. Moroy) (3 ECTS)

**BQABY050** Dynamics of macromolecules (D. Flatters, P. Fuchs) (3 ECTS)

**BQ2BY060** Structural bioinformatics in toxicology (D. Flatters, G. Moroy, O. Taboureau) (3 ECTS)

**BQ2AY120** Systems biology & ligands, database (O. Taboureau & K. Audouze) (3 ECTS)

**Options to choose from (\* recommended)**

**BQ2BY080** *In silico* practices in 3D protein complexes\* (K. Moncoq, O. Taboureau) (3 ECTS)

**BQ2BY090** Advanced simulation methods\* (S. Murail) (3 ECTS)

**BQ2BY100** Research in drug design (O. Taboureau) (3 ECTS)

**BQ2BC110** WEB or other programming in BI-UE2 (3 ECTS)

**Internship I (6 ECTS) (G. Moroy, V. Gruber, O. Taboureau, C. Etchebest)**

**BQ2BT130** : Internship 4 (G. Moroy, V. Gruber, O. Taboureau) (6 ECTS)

**SEMESTER 2 of the ISDD Bioactive Molecules pathway**  
**SEMESTER 2 ERASMUS University of Milan (30 ECTS)**

**SEMESTER 3 - Université Paris Diderot (30 ECTS)**

<b>EU0</b>	<b>Refresher course (A-C. Camproux)</b>
	<b>BQAAY010</b> Unix and R basics (Upgrade) (G. Moroy) <b>BQ2CY021</b> Toxicology-biochemistry-chemistry upgrade (A-C Camproux)
<b>EU1</b>	<b>Data analysis in drug design (8 ECTS) (A-C. Camproux)</b>
	<b>BQAAY070</b> Python1 project (P. Fuchs & P. Poulain) (3 ECTS) Or <b>BQAAY080</b> Python 2 programming or <b>BQAAY030</b> Python project (S. Murail) (3 ECTS)
	<b>BQ2CY050</b> Data Analysis and Drug Design (A-C Camproux & L. Regad) (3 ECTS)
	<b>BQ2CY060</b> Application in Drug Design & QSAR (O. Taboureau & L. Regad) (1 ECTS)
	<b>BQ2CY070</b> Seminars and R&D (A-C Camproux) (1 ECTS)
<b>EU2</b>	<b>Molecular analysis and dynamics &amp; drug design (7 ECTS) (D. Flatters)</b>
	<b>BQ2CY090</b> Structural exploration of proteins (L. Regad) (3 ECTS)
	<b>BQ2CY100</b> Dynamic target analysis I (D. Flatters) (2 ECTS) Or according to level
	<b>BQ2CY110</b> Dynamic target analysis II (G. Moroy) (2 ECTS)
	<b>BQ2CY080</b> Structural and dynamic modeling (G. Moroy & D. Flatters) (2 ECTS)
<b>EU3</b>	<b>High-throughput screening: structure &amp; ligand-based (5 ECTS) (G. Moroy)</b>
	<b>BQ2CY120</b> Structure-based (G. Moroy) (3 ECTS)
	<b>BQ2CY130</b> Ligand-based (O. Taboureau) (1 ECTS)
	<b>BQ2CY140</b> Hits to lead (O. Taboureau) (1 ECTS)
<b>UE4</b>	<b>Space analysis of macromolecules (4 ECTS) (O. Taboureau)</b>
	<b>BQ2CY150</b> Toxicology and biotransformation (A. Baeza, F. Rodrigues-Lima) (3 ECTS)
	<b>BQ2CY160</b> Medicinal chemistry, pharmaceutical molecules (C. Mayer & F. Barbault) (1 ECTS)
<b>EU5</b>	<b>Preparation for research in Drug Design (6 ECTS) (L. Regad)</b>
	<b>BQ2CY170</b> 3-project Drug Design tutorial (L. Regad & O. Taboureau) (2 ECTS)
	<b>BQ2CY180</b> Tutored research project design (A-C Camproux) (2 ECTS)
	<b>BQ2CY190</b> Application of high-throughput screening (G. Moroy) (2 ECTS)

**SEMESTER 4 - Université Paris Diderot (30 ECTS)**

<b>EU6</b>	<b>INTERNSHIP (30 ECTS) (A-C. Camproux)</b>
	<b>BQ2DY010</b> Tutored research project preparation (A-C Camproux & S. Murail) (3 ECTS)
	<b>BQ2DT020</b> International or corporate research internship (A-C Camproux) (27 ECTS)