MASTER BIOINFORMATIQUE (2025-2029)
Parcours Recherche ISDD : Molécules Bioactives
Double diplôme franco-italien – Erasmus Mundus ChEMoinformatics+
Université Paris Cité & Università degli Studi di Milano

*cours en anglais/courses in English

SEMESTRE 1 : Université Paris Cité (30 ECTS)

Refresher courses (0 ECTS)

BQ8AE015 : Fundamentals of Unix & R* (L. Regad)

BQBCE035 : *Biostatistics and methodology, chemistry** *(A.C. Camproux & A. Badel)*

Fundamentals of chemistry (6 ECTS)

CH0AE085 : Biological chemistry* (3 ECTS, O. Reinaud)

CH0CE095 : NMR of biomolecules: structures, dynamics & interactions* (3 ECTS, N. Giraud)

Chemistry for drug design (6 ECTS)

BQ2AE155 : Chemistry: Chirality – non-covalent bonds* (3 ECTS, F. Maurel)

BQ2AE165 : Reactivity and organic synthesis* (3 ECTS, F. Chau)

Informatics & mathematics for drug design (9 ECTS)

BQ2AE045 : Mathematics basis* (3 ECTS, A.C. Camproux & S. Pasquali)

BQBAE085 : Programming* (3 ECTS, O. Taboureau) ***ou***

BQAAE105 : Python, Niveau 2 (3 ECTS, P. Fuchs & P. Poulain)

BQBAE105 : Biostatistics* (3 ECTS, A.C. Camproux) ***ou***

BQAAE085 : Biostatistiques et programmation R avancées, Niveau 2 (3 ECTS, A. Badel & A.C. Camproux)

Chemoinformatics (6 ECTS)

BQ2AE125 : Chemoinformatics 1* (3 ECTS, J. Diharce & V.K. Tran-Nguyen)

BQ8AU125 : Chemoinformatics 2* (3 ECTS, O. Taboureau & L. Regad)

- BQ2AE135 : Chemometry
- BQ2AE145 : R project in chemoinformatics

Outils et recherche en drug design (3 ECTS)

BQ8AU155 : Outils et recherche en drug design (A.C. Camproux & O. Taboureau)

- BQ2AE185 : Séminaires en Drug design, bio-informatics*
- BQ2AE195 : Outils en Drug design pour l'alternance

BQ2AU205 : Anglais (UFR EILA)

Obligatory module 1 for the Erasmus Mundus Joint Master's program

BQ8AE235 : Molecular modeling project* (V.K. Tran-Nguyen & O. Taboureau)

UE transverses facultatives (0 ECTS)

BQ8AU175 : UE d'ouverture (UE « Algorithmique »)

SEMESTRE 2 : Università degli Studi di Milano (30 ECTS)

BQBBE015 : Chemometrics* (6 ECTS, C. Tommasi)

BQBBE025 : Protein engineering and molecular enzymology* (6 ECTS, M. Vanoni, M. Nardini)

BQBBE035 : Medicinal chemistry* (6 ECTS, L. Belvisi)

BQBBE045 : Simulation and modeling of biomolecules* (6 ECTS, S. Pieraccini)

BQBBE055 : C language programming* (6 ECTS, L. Capra) or Synthetic methods in biotechnology* (6 ECTS, P. Seneci) or Another course available in Milan* (6 ECTS)

Obligatory module 1 for the Erasmus Mundus Joint Master's program*

(Université Paris Cité, January/February)

BQ8AE235 : Molecular modeling project* (V.K. Tran-Nguyen & O. Taboureau)

BQ2BE045 : Initiation au Drug design* (G. Moroy)

BQ2BE035 : Biological systems and ligands, databases* (O. Taboureau)

Recommended :

BQABE015 :** Intelligence artificielle 1 (A. Badel & A.C. Camproux)

BQ2BE075* : Bio-informatique structurale en toxicologie* (Flatters, G. Moroy & O. Taboureau)

SEMESTRE 3 : Université Paris Cité (30 ECTS)

Refresher courses (0 ECTS)

BQ8AE015 : Fundamentals of Unix & R* (0 ECTS, L. Regad) ***or***
BQBCE035 : Biostatistics and methodology, chemistry* (0 ECTS, A.C. Camproux & A. Badel)

Structural & AI analysis for drug design (12 ECTS)

BQBCE045/ BQ2CE085 : Artificial intelligence for drug design*/ Intelligence artificielle avancée pour le Drug Design (3 ECTS, A.C. Camproux & L. Regad)

BQBCE055 : Practical molecular dynamics & structure* (3 ECTS, D. Flatters)

BQ2CE045 : Advanced dynamics analysis* (3 ECTS, G. Moroy & D. Flatters)

BQ8CE035/ BQ2CE065: Protein structural exploration*/Exploration structurale des protéines (3 ECTS, L. Regad)

Structure and ligand-based high-throughput screening (6 ECTS)

BQ2CE095 : Structure-based* (3 ECTS, G. Moroy)

BQ8CU085 : Ligand-based & Hits to lead* (3 ECTS, O. Taboureau)

- BQ2CE105 : Ligand-based
- BQ2CE115 : Hits to lead

Advances in computer-aided drug design or Drug design applications (including 3 ECTS for *Master Thesis prova finale*) **(6 ECTS)**

BQBCU125 Drug design applications* (Regad, Taboureau, Flatters, Moroy & Tran-Nguyen)

- BQBCE115 : QSAR application & AI application (2 ECTS)
- BQ2CE155/BQ8CE095 : Application en Modélisation structurale ***ou*** Dynamique and Molecular Modeling application (2 ECTS)
- BQ2CE165 : Virtual screening application (2 ECTS)

Challenges of research in drug design (*Master Thesis prova finale*)* **(6 ECTS)**

BQ8CU105 : Challenges of research in drug design* (L. Regad, O. Taboureau, V.K. Tran-Nguyen & A.C. Camproux)

- BQ2CE125 : Research protocol in In silico drug design (2 ECTS, L. Regad & O. Taboureau)
- BQBCE135 : Quantum chemistry & BQ2CE135: Networking in Drug Design (V.K. Tran-Nguyen & A.C. Camproux)
- BQ2CE215 : Cheminformatics tools for biological therapeutics (2 ECTS, A.C. Camproux)

Obligatory module 2 for the Erasmus Mundus Joint Master's program

BQ8CE135 : Project in collaboration with industry* (A.C. Camproux)

Options complémentaires (0 ECTS)

BQ2CE205 : UE complémentaires : Medicinal chemistry* (V.K. Tran-Nguyen)
BQ8CE115 : Chemical interaction : Thermodynamics* (A.C. Camproux & S. Pasquali)

SEMESTRE 4 : Université Paris Cité (30 ECTS)

Erasmus Mundus internship (30 ECTS)

BQ8DE015 : Erasmus Mundus M2 Training period (30 ECTS, A.C. Camproux & G. Marcou)