**MASTER IN BIOINFORMATICS (2019-2020)**

**Research Course ISDD-Macromolecules**

**ISDD-Modélisation des Macromolécules**

**SEMESTER 1 - Paris Diderot University (30 ECTS)**

|  |  |  |
| --- | --- | --- |
| **UE0** | **Upgrade (G. Moroy)**   |  | | --- | | **EC 001 Unix and R:Base (Upgrade)** (G. Moroy) | |
| **UE1** | **Fundamentals in biochemistry and biostatistics (7 ECTS) (C. Etchebest)**   |  | | --- | | **EC 101** Biochemistry(C. Etchebest, N. Caulet, F. Rodrigues-Lima) (4 ECTS) | | **EC 102** Biostatistics and R programming (L. Regad) (3 ECTS)  Or depending on the level  **EC 103** Tutored project in biostatistics and R(A-C Camproux & A.Badel) (3 ECTS) | |
| **UE2** | **Programming and mathematical tools (9 ECTS) (J.C Gelly & A. Badel)**  **(3 EC according to the level)**   |  | | --- | | **EC 201** Mathematics I (A-C Camproux) (3 ECTS) Or  **EC 202** Optimisation and biology learning(D. Flatters, F. Guyon) (3 ECTS) | | **EC 203 ou 204** Python programming 1 or 2 (P. Fuchs & P. Poulain) (3 ECTS) | | **EC 205** Algorithmic 1 (C. Delporte, H. Fauconnier) (3 ECTS) Ou  **EC 206** ECUE dans M1 BI-UE2 (3 ECTS) | |
| **UE3** | **Pratical and depth study (8 ECTS) (V. Gruber)**  **(3 EC of your choice)**   |  | | --- | | **EC 303** Biological systems & ligands, database (O. Taboureau & K. Audouze) (3 ECTS) | | **EC 304** Toxicology Database(A. Baeza) (3 ECTS) | | **EC 305** ADME/chemometrics (O. Taboureau) (2 ECTS) **Or**  **EC 306** English (N. Kubler) (2 ECTS) | |
| **UE4** | **Thematic orientation I in chemistry and chemoinformatic (6 ECTS) (O. Taboureau & D. Flatters)**  **(2 EC of your choice)**   |  | | --- | | **EC 401** Chemoinformatics (K. Audouze) (3 ECTS) | | **EC 402** Chemistry : chirality - non covalent bonds (F. Maurel, O. Taboureau) (3 ECTS) | | **EC 403** Option for Drug Design (O. Taboureau) (3 ECTS) | |

**SEMESTER 2 –Paris Diderot University (30 ECTS)**

|  |  |  |  |
| --- | --- | --- | --- |
| **UE5** | **Fondamentals biophysic and data analysis (6 ECTS) (A-C. Camproux)**   |  | | --- | | **EC 501 :** Massive data analysis (A-C. Camproux, A. Badel) (3 ECTS) | | **EC 502 :** Biophysical approaches for the study of interactions(V. Gruber & W. Majeran) (3 ECTS) | |
| **UE6** | **Thematic orientation in Protein modeling (18 ECTS) (G. Moroy & O. Taboureau)**   |  | | --- | | **EC 601** Protein-Protein Docking \* English course (A-C. Camproux, O. Taboureau) (3 ECTS) | | **EC 602** Introduction to In Silico Drug Design (G. Moroy) (3 ECTS) | | **EC 603** Structural bioinformatics 2 : Dynamics \* (D. Flatters, P. Fuchs) (3 ECTS) | | **EC 604** Structural bioinformatics in Toxicology (D. Flatters, G. Moroy, O. Taboureau) (3 ECTS) | | **EC 605** Chemistry RéSO (Reactivity and organic synthesis) (F. Chau) (3 ECTS) | | **1 EC** to choose among the following  **EC 606** *In silico* practices in 3D protein complexes (K. Moncoq, O. Taboureau) (3 ECTS)  **EC 607** Advanced simulation methods(S. Murail) (3 ECTS)  **EC 608** Visiting professor or drug design option (O. Taboureau) (3 ECTS)  **EC 609** ECUE WEB in others in BI-UE2 (3 ECTS) | |
| **UE7** | **Internship professionalisation I (6 ECTS) (G. Moroy, V. Gruber, O. Taboureau, C. Etchebest)**   |  | | --- | | **EC 701 :** Internship 4 (G. Moroy, V. Gruber, O. Taboureau) (6 ECTS) | |  | |

**OU SEMESTER 2 ERASMUS University of Milan (30 ECTS)**

**(Semester 2 of the course ISDD Bioactive Molecules)**

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

|  |  |  |
| --- | --- | --- |
| **UE0** | ***Upgrade (A-C. Camproux)***   |  | | --- | | ***EC 001*** *Unix and R base (Mise à niveau) (G. Moroy)*  ***EC 002*** *Upgrade Toxicology-Biochemistry-Chemistry (A-C Camproux)* | |
| **UE1** | **Data analysis in drug design (8 ECTS) (A-C. Camproux)**   |  | | --- | | **EC 101** Pythonproject 1 (P. Fuchs & P. Poulain) (3 ECTS)  Or depending on the level  **EC 102** PythonProgramming 2 (P. Fuchs) (3 ECTS) | | **EC 103** Data Analysis and Drug Design (A-C Camproux & L. Regad) (3 ECTS) | | **EC 104** Application in Drug Design & QSAR (O. Taboureau & L. Regad) (1 ECTS) | | **EC 105** Seminars and R&D (A-C Camproux) (1 ECTS) | |
| **UE2** | **Molecular & Drug analysis and dynamics (7 ECTS) (D. Flatters)**   |  | | --- | | **EC 201** Structural exploration of proteins (L. Regad) (3 ECTS) | | **EC 202** Dynamic Target Analysis I (D. Flatters) (2 ECTS)  Or depending on the level  **EC 203** Dynamic Target Analysis II (G. Moroy) (2 ECTS) | | **EC 204** Structural and Dynamic Modelling (G. Moroy & D. Flatters) (2 ECTS) | |
| **UE3** | **High throughput : structure & ligand-based (5 ECTS) (G. Moroy)**   |  | | --- | | **EC 301** Structure-based (G. Moroy) (3 ECTS) | | **EC 302** Ligand-based (O. Taboureau) (1 ECTS) | | **EC 303** Hits to lead (O. Taboureau) (1 ECTS) | |
| **UE4** | **Analysis of the space of molecules (4 ECTS) (O. Taboureau)**   |  | | --- | | **EC 401** Toxicologie et biotransformation (A. Baeza, F. Rodrigues-Lima) (3 ECTS) | | **EC 402** Chimie médicinale, molécules pharmaceutiques (C. Mayer & F. Barbault) (1 ECTS) | |
| **UE5** | **Preparation for research in Drug Design (6 ECTS) (L. Regad)**   |  | | --- | | **EC 501** 3-projects in Drug Design tutored (L. Regad & O. Taboureau) (2 ECTS) | | **EC 502** Design of Research Project - tutored (A-C Camproux) (2 ECTS) | | **EC 503** High Throughput Screening Application (G. Moroy) (2 ECTS) | |

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

|  |  |  |
| --- | --- | --- |
| **UE6** | **INTERNSHIP (30 ECTS) (A-C. Camproux)**   |  | | --- | | **EC 601** Preparation of tutored research project (A-C Camproux & S. Murail) (3 ECTS)  **EC 602** International or company research internship (A-C Camproux) (27 ECTS) | |