Biophysics and structural bioinformatics II

Lecturers
Dimitri GILIS (Coordinator), Fabrizio PUCCI and Wim VRANKEN

Course mnemonic
BINF-F405

ECTS credits
5 credits

Language(s) of instruction
Unknown

Course period
Second term

Campus
Solbosch

Course content

This course is divided into six topics:

- Molecular dynamics
- Protein-protein docking
- Intrinsically disordered proteins
- NMR to study protein structures and dynamics
- Trade-offs in protein structures
- Quantum mechanics applied to biological macromolecules

The practical courses consist in a project.

Objectives (and/or specific learning outcomes)

At the end of the course, the student will be able:

- To extract relevant information from scientific papers.
- To examine thoroughly some topics in the field of structural bioinformatics.
- To choose and use various bioinformatics tools to solve problems.

Pre-requisits and co-requisits

Co-requisites courses

BING-H5000 | Introduction à la bioinformatique et à ses applications | 5 crédits

Teaching method and learning activities

Theoretical course (3 ECTS): scientific papers reading, presentations of the papers and discussion of these papers.

For each topic the students will have to read scientific papers or book chapters that the teacher will introduce through a presentation or via email.

The students will be divided into six groups. Each group will present the papers of one of the six topics. During this presentation, the students will summarize the important elements of the papers. The other students will read the papers of the topic.

During the same course as the presentation, the papers will be discussed. The students that prepared the presentation will also answer to the questions of the other students and of the teacher.

Practical courses (2 ECTS): execution of a project.

Contribution to the teaching profile

MA Bioinformatics and modeling

- 1.2. Critically analyse original research articles in bioinformatics and modelling.
- 1.5. Be able to use existing bioinformatics resources and develop new software (algorithms, databases, analysis tools, etc.).
- 2.1. Be creative in posing a problem in the field of bioinformatics and modelling and formulate testable working hypotheses.
- 2.3. Discuss and compare the results obtained with existing scientific data.
- 4.2. Write a research report with clarity and rigour.
- 4.3. Present orally the results of a work in a clear and concise way and confront them with the questions and criticisms of the audience

MA Chemistry and bioindustries (Bioengineers)

- Bioinformatics
- Select relevant statistical analysis methods, develop models, interpret results and critically assess their reliability.
- Apply bioengineering principles and techniques in research and development projects in the bio-industry sector, from the laboratory scale to the industrial application scale.
- Synthesise, popularise and communicate results in a way that is appropriate to the audience, both orally and in writing, in French and English.

Course notes

Université virtuelle and Podcast

Other information

Place(s) of teaching

Solbosch

Contact(s)

Email: dimitri.gilis@ulb.be

Office localization: Solbosch, UD3.203

Phone: 02 650 36 15

Evaluation method(s)

Oral examination and Written report

Evaluation method(s) (additional information)

- The oral presentation of one of the topics of the course is evaluated according these criteria:
  - Quality of the presentation: identification of the important elements of the papers and summary of these elements.
  - Quality of the answer to the questions.
  - Understanding of the paper.
- Evaluation of the reports of the project.
- The "theoretical part" of the course will be evaluate during an oral exam. For this exam, each student will select randomly one of five topics, with the topic that the student presented during the course excluded. The student will have about 20 minutes to prepare a short summary of the important elements of the papers of the chosen topic. The student may have the papers and his personal notes for this preparation. The topic will be discussed with the teachers.

Any student who did not deliver the practical courses reports and/or did not present one of the topic will not be allowed to present its oral exam.

Determination of the mark (including the weighting of partial marks)

Let n_p be the mark of the presentation, n_proj be the mark of the report for the practicals and n_o be the mark of the oral exam. The final mark, n_f, is equal to: n_f = 0,3 ▪ n_p + 0,2 ▪ n_proj + 0,5 ▪ n_o.

For the "presentation" and the "practical course", only one evaluation is organized per academic year.

Carry-over from one academic year to the next

If the final mark for the teaching unit is less than 10/20, intermediate marks of 10/20 or higher (n_p, proj and n_o) will be carried over from one year to the next, unless the student requests otherwise.

Main language(s) of evaluation

French and English

Programmes

Programmes proposing this course at the faculty of Sciences

MA-BINF | Master in Bio-informatics and Modelling | finalité Research/unit 1 and MA-IRBC | Master in Chemistry and Bio-industries Bioengineering | finalité Professional/unit 2

Programmes proposing this course at the Brussels School of Engineering

MA-IRBC | Master in Chemistry and Bio-industries Bioengineering | finalité Professional/unit 2