

**8045 – MSc in Bioinformatics for Health Sciences**  
**32037 – RBI. Research in Bioinformatics**

**Syllabus Information**

**Academic Course:** 2017/18

**Academic Center:** 804 - Official Postgraduate Programme in Biomedicine

**Study:** 8045 – Bioinformatics for Health Sciences - MSc

**Subject:** 32037 – RBI. Research in Bioinformatics

**Credits:** 30.0

**Course:** 2nd

**Teaching languages:** English

**Teachers:** Baldo Oliva and Nuria B. Centeno

**Teaching Period:** 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> term

***Presentation***

This document is a guide for the Master Thesis, which includes two compulsory subjects of the second year: Research in Bioinformatics (30 ECTS) and Master Completion Project (10 ECTS).

Both subjects aim to provide practical education through the elaboration of a research in the field of Bioinformatics including:

- Elaboration of a detailed proposal of the project, where stating background and justification, objectives, hypothesis, methodology and expected calendar of development
- Develop a bioinformatic project under the supervision of a senior researcher at the host institution.
- Disseminate the obtained results in a form of a paper, which will follow an in-house peer review process
- Oral presentation of the master thesis.

Since master thesis is a short-term project, this will usually be part or a subproject within a larger project carried out by the host research group. Master students will require supervision and guidance, but will be ultimately responsible for accomplishing the project, with the necessary intellectual, hands-on and attitude commitment.

## ***Associated skills***

### General:

1. To know the organization and functioning of a research team.
2. To acquire basic notions in elaborating working hypothesis from bibliographic and experimental sources of data, presentation of preliminary results, planning milestones and expected results during the development of a project.
3. To integrate concepts and tools acquired during the master to solve research questions.
4. To acquire the ability to develop a strategy to solve a problem under the supervision of a senior researcher.
5. To take the initiative to tackle the problems arising during the research (not necessarily solve them).

### Specific:

1. To understand the importance of high-quality background information when preparing a research project.
2. To train the ability to project possible outcomes of a planned research and identify sources of troubles and ways of troubleshooting.
3. To train the capacity to adjust objectives and expectations to real resources and time windows.
4. To learn basic elements of communication, ethical principles in the work environment, and principles governing teamwork.

These competencies will unfold in the following aspects:

#### a) Instrumental:

1. Training of analytical and synthesis abilities.
2. Training in management of information sources.
3. Training in oral and written communication.

#### b) Interpersonal:

1. Training teamwork abilities (sharing tasks, collaborative work, criticize others, accept criticism from others).
2. Training abilities for discussing in group.

#### c) Systemic:

1. Training in problem solving, decision making and time management.
2. Ability to produce, test and project own ideas.
3. Training in working for quality.

## ***Learning outcomes***

The master thesis is an opportunity to integrate all the knowledge learned and applying the abilities acquired through the master, as well as improving professional and research skills.

Accordingly, the main learning aims are:

1. to acquire competence on the scientific method.
2. to train the ability to tackle a scientific problem from the bioinformatic perspective.
3. to acquire competence on disseminating results, both written and orally.

## ***Contents***

### **Calendar**

Last week of September: Starting the internship at the host institution

2nd week of November: Research proposal submission

3rd week of January: Feedback on the proposal by the reviewers

2nd week of May: Paper submission (1st version)

1st week of June: Feedback on the paper by the reviewers

3rd week of June: Paper submission (final version)

Last week of June: Final comments of the reviewers (if needed)

1st week of July: Oral presentation of the master completion project

### **Description of the main outcomes of the master thesis**

The master thesis will be developed along all the second course of the master. These are the main key activities to be done:

#### **Research proposal submission**

During the first term (see Section Calendar above) the student must submit through the Campus Global the research proposal, which will have two parts:

1) A "**cover letter**" for the editorial board in which you introduce the relevance of the work and the goals. The letter has to include: 5 reviewers with full address and e-mail contact. The student should ensure the reviewers have agreed, so that the coordinator may contact them as putative reviewers of the work. **Important: this letter must be signed by the student and her/his supervisor.** It is mandatory the supervisor had reviewed the proposal, and the signature of the supervisor is intended to ensure this.

2) A **protocol** document of "how to do" the project, including:

- Keywords to identify the main lines of the project
- Introduction of the problem and state of the art
- Working hypothesis and proof of concept
- Objectives (general and specific)
- Description of the methods to tackle the problem
- Gantt chart of execution (Chronogram)

The maximum length of the protocol is five pages.

### Paper submission (1st version)

In mid-May the student must submit through EasyChair the first version of the master thesis, written as a paper. Details of how to use EasyChair will be provided in due time.

The report must have the agreement of the supervisor and will have two parts:

1) A “**cover letter**” of the work with a short exposition of the problem and the main conclusions, plus the tasks developed by the student and the key works that identify the project. **Again, the cover letter must be signed by the student and her/his supervisor.**

2) A **paper** presenting the project, including:

- Abstract
- Introduction with the state of the art, statement of the problem, and the objectives suggested on the project
- Methods and software development (if necessary).
- Results, discussion and conclusions
- References

The maximum length of the paper is 7 pages. By default it must be written using the template of the journal Bioinformatics, which you can find in the section “Instructions to authors” of its website

([http://www.oxfordjournals.org/our\\_journals/bioinformatics/for\\_authors/general.html](http://www.oxfordjournals.org/our_journals/bioinformatics/for_authors/general.html)).

However, if the student and the supervisor are planning to publish the master thesis in another journal in the future, its template can be used instead.

### Paper submission (final version)

In mid-June, the student will receive the reviewers’ feedback on the paper. After discussing this feedback with his/her supervisor, the student will produce a final version of the paper. This new version will be uploaded through EasyChair.

In the final version, the cover letter must be addressed to the reviewers, answering their comments and highlighting the changes done due to their feedback.

### Oral presentation

The first week of July, there will be a workshop in which the students will defend their master projects. The workshop will be organized in sessions, each one devoted to a particular area of research. In each session a tribunal will evaluate each presentation. The tribunal will be formed by two experts and a student. All the students will act as tribunal by rotation. The student will know in advance in which talk will act as tribunal.

Each talk will be 10 minutes of presentation and 5 minutes for questions. The tribunal will make two questions, one made by one expert and the other by the student acting as tribunal.

It is important that the length of the presentation fits the time of exposition. Therefore is advised that the presentation does not have more than 10 slides.

## ***Evaluation***

The assessment of the subjects “Research in Bioinformatics” and “Master completion project” has some elements in common, and others are specific for each subject.

The elements that will be used for the assessment are:

1. Evaluation of the research proposal by the reviewers, which will take into account the scientific relevance of the project, its feasibility and the formal quality of the document.
2. Evaluation of the internship by the supervisor, which will evaluate the performance of the student during the internship, and his/her commitment with the project.
3. Evaluation of the paper by the reviewers, which will take into account the proficiency in the methodology used, the quality of the results, the implication of the student in the project and the formal quality of the manuscript, as well as the improvements made between the first and the final version.
4. Evaluation of the oral presentation by the tribunal. The final grade will be the score given by the experts (80%) plus the score given by the student (20%). The assessment will take into account the communication skills, the ability of the student to critically discuss the results and the expectations of the project, the ability to answer the questions made by the tribunal, the ability to make questions while acting as tribunal, and the time management.

In “Research in Bioinformatics” the grade will consist of three elements: the evaluation of the research proposal (20%), the evaluation of the supervisor (20%) and the evaluation of the paper (60%).

In “Master Completion Project” the grade will consist of two elements: the evaluation of the oral presentation (40%) and the evaluation of the paper (60%).