Universitat Autònoma de Barcelona

2023/2024

Bachelor's Degree Final Project

Code: 106544
ECTS Credits: 12

Degree	Type	Year	Semester
2503758 Data Engineering	OB	4	0

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Prerequisites

The prerequisites for the Bachelor's Degree Final Project (TFG: "Treball de final de grau" in Catalan) are those included in the UAB's progression plans (registration progress), which specifies that, in order to be able to register for the TFG, students must have passed, at least all first-year subjects and a minimum of two thirds of the total ECTS in the syllabus (that is, 160 ECTS).

At all events, it is recommended that students register for the TFG if is in a position to complete their degree studies in the same academic year in which the TFG would be written.

Objectives and Contextualisation

The TFG should be seen as a globalising subject facilitating an integrated assessment of the competences associated with the degree. It represents the culmination of the learning process in which students should show a level of maturity in multiple competences and learning outcomes. Students must demonstrate their ability to integrate and put into practice the knowledge, skills and attitudes acquired throughout their studies (associated both with the degree) and thereby facilitate the assessment of their professional capacity in developing a project.

Competences

- Conceive, design and implement efficient applications for the analysis and management of big data.
- Demonstrate sensitivity towards ethical, social and environmental topics.
- Develop critical thinking and reasoning and know how to communicate it effectively in both your own language and in English.
- Generate innovative and competitive proposals in professional activity and research.

- Make a critical evaluation of work carried out.
- Plan and manage the available time and resources.
- Prevent and solve problems, adapt to unforeseen situations and take decisions.
- Produce, present and defend work consist of a project in the field of data engineering in which the competences acquired in the degree course are synthesised and included.
- Search, select and manage information and knowledge responsibly.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

Learning Outcomes

1. Analyse the cost (in terms of materials, time and personnel) of different alternatives, comparing it with the resources available.
2. Break down the general problem into tasks that are simpler and easier to perform.
3. Define the specifications for a computer application or system.
4. Demonstrate sensitivity towards ethical, social and environmental topics.
5. Develop critical thinking and reasoning and know how to communicate it effectively in both your own language and in English.
6. Establish a work plan that fulfills the project's objectives.
7. Generate innovative and competitive proposals in professional activity and research.
8. Identify any regulations (laws, rules, etc.) that could be applicable in the project and be able to apply these and document them appropriately.
9. Identify the criteria for evaluating the validity of proposed solutions.
10. Identify the particular objectives of the project and define its specifications.
11. Make a critical evaluation of work carried out.
12. Plan and manage the available time and resources.
13. Prevent and solve problems, adapt to unforeseen situations and take decisions.
14. Search, select and manage information and knowledge responsibly.
15. Seek out information on similar problems, with proof of having consulted reliable reference sources in the field of study.
16. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
17. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
18. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
19. Study the technical and economic viability of developing or adapting a computer application or system.

Content

What is the Bachelor's Degree Final Project (TFG: "Treball de final de grau")?

The TFG is an original exercise that should be carried out individually and presented and defended before a university examination committee. It consists of a project within the field of specific technologies in Data Engineering, of a professional nature, synthesising and integrating the competences acquired throughout the degree. This project represents a student workload of 300 hours.

Only one type of TFG is defined, this being an "applied project", which should not be seen only as a development project. The objective of this project could be any problem, system or situation that can be solved by applying techniques, practices and the resources pertaining to the profession.

Obviously, the proposals must take into account the competencies associated with the subject. In addition, the project must have well-defined start and end points as it must be able to be completed in 300 hours over a single semester. When making the proposal and defining the related work, therefore, the competences and time requirements should both be taken into account.

Each project must be considered unique and original. This does not mean that it needs to be innovative or to produce improvements with respect to other similar solutions. But it must be unique in terms of its resolution. It is therefore possible for distinct students to carry out the same project or to divide a large project among several students.

The final objective of the project is not necessarily to implement an application or a productive system, given restraints on time and resources. However, correct completion of the whole process must be ensured, as well as ensuring that the development of the possible application or system is viable on thebasis of the analysis and the design produced. However, a demonstrated ability to develop a part of the application or a prototype of the system should be positively valued.

Who can propose TFGs?

a) Lecturing staff/departments. Following the calendar approved by the School, staff or departments should propose subjects/projects using the corresponding computer application. If deemed appropriate, the person responsible for the subject and/or the TFG Committee will determine whether the proposed projects are appropriate.

b) Companies or external Institutions. The project can be carried out in the framework of a collaboration agreement with a company or external institution. The entity must submit the proposal in writing (following the model established for this purpose, on the dates specified) to the person responsible for the subject. This staff member and/or the TFG Committee will determine whether the proposed project is appropriate (assessing whether the competences established for the degree-and the corresponding specialisation-can be evaluated, and ensuring that the duration and workload are suitable). If the proposal is accepted, a tutor will be assigned from the corresponding specialisation and all relevant data will be logged into the application. These projects are supervised by an academic tutor from the School and by a tutor from the company.

c) Students. Students can make a proposal in writing (following the model established for this purpose, on the dates specified) referring to a specific subject or project to the lecturer responsible for the specialisation being studied. Acceptance is not immediate, as assessment must first be made of whether the competences established for the degree-and the corresponding specialisation-can be evaluated, andthat the duration and workload are suitable. The lecturer responsible for the specialisation will accept or reject the proposal; if accepted, this lecturer will instruct the student to find a tutor. If the student is unable to find a tutor, they will have a tutor assigned to them at the end of the assignment process.

Methodology

The Moodle classroom on the UAB Virtual Campus and/or the TFG monitoring application will specify the calendar/timeline to be followed, the mechanism for consulting and selecting proposals, and the project-assignment system.

Students must complete the TFG in a single semester and have only one exam session in which to present it in July.

TFG registration is carried out in mid-July (in the ordinary period, with all other subjects in the syllabus).

A computer application (Sigma-TFE) will be used for offering, registering and assigning projects. Project assignment must be completed during the week prior to the beginning of the semester.

Once the TFG has been assigned, the tutor and student will meet during the first week of the semester to determine the work to be carried out and to define the general guidelines for monitoring the project.

The tutor will carry out project monitoring through a minimum of 4 tutorial/supervision sessions. Before each of these, the student must submit a document outlining the current state of the project, specifying the work carried out in each of the stages and the procedures that are being carried out to ensure its completion. These documents will be stored in a TFG dossier that will include the original documents presented for each monitoring tutorial, as well as any improvements introduced in the reports produced on the basis of the tutor's comments and observations.

The TFG dossier will be the compendium of all the work carried out during the course of the project (reports, feasibility study, planning diagrams, code, user manuals, data specifications, analysis and design diagrams, use cases, business plan, legal and ethical studies, etc.) and must be submitted at the end of the process in digital format.It must be presented in an organised and easily accessible manner. If relevant, it should also reflect the changes produced in the submitted documents, in light of the comments that the tutor may have proposed throughout the tutorials. All changes must be verified by means of a "list of changes".

Monitoring sessions:

- 1st monitoring session : the student submits an initial report
- 2nd monitoring session : the student submits a first progress report (I)
- 3rd monitoring session : the student submits a second progress report (II)
- 4th monitoring session : the student submits the proposal for the final report and finalises the project.
- 5th monitoring session : the student submits the proposal for the presentation/defence.

Submission of all reports is compulsory, on the dates specified by coordination. Submission outside these deadlines may be accepted if justifiable causes can be demonstrated. However, any such delay may negatively affect the grade given by the tutor.

For each of the monitoring sessions, the sections to be included in the corresponding report and, therefore, in the TFG dossier must be defined. Some sections will be compulsory and others will be agreed on with the tutor, depending on the type of project and specialisation.

Evaluation rubrics have been drawn up to evaluate each of the reports, in order to ensure greater uniformity objectivity and traceability of final grades. Once each of the reports has been evaluated, the corresponding rubric will be published in the monitoring application, with the provisional grades and any observations considered appropriate for possible improvement (for inclusion in the TFG dossier), and for the improvement of subsequent reports.

Each document must include identify the student and the project: Student's Name, Academic Year, Specialisation, Project Title, Name of Tutor, and Date. Additionally, allrelevant resources for written communication must be adequately used (writing, spelling, presentation, ...); recommended presentation formats must also be followed, where applicable.

The three reports should include the following (important: consult the evaluation rubrics in question):

- Initial report. The main objective of this report is to provide a detailed proposal of the TFG, which sets out the goals to be attained and the methodology to be used in achieving them. Similarly, the various steps to be followed in developing the project, both in terms of tasks to be carried out and the time-frame, must all be planned in detail. This proposal requires prior reflection on the part of the student, who will have to consult relevant sources of information in order to justify all decisions made and to programme the necessary work. The proposal should include the following, at the least:
    - Preliminary information on the topic to be addressed or the problem to be solved, specifying and commenting on the sources of information used.
    - A proposal covering the TFG's objectives and/or the point that the development of the proposed problem aims to reach.
    - General explanation of the methodology to be followed in attaining the objectives.
    - Identification of the steps to follow in developing the project; establishing a work plan to carry this out.
    - Referential bibliography consulted and complementary sources

- Progress Report I. The main objective of this report is to record the progress made in carrying out the TFG. At the same time, this report should ratify theplanning carried out at the end of the initial phase, or, where appropriate, should propose any changes to be introduced to ensure a suitable conclusion of the TFG within the intended time period. Thisreport should include the following, at the least:

    - Indication of the level of monitoring for the foreseen planning, and of the adjustments made and/or planned, if deemed necessary, with their justification in the latter case.
    - If necessary, indication of the changes introduced in the objectives established and/or the expected work methodology, both duly justified.
    - General explanation of the methodology being followed to achieve the objectives.
    - Referential bibliography consulted and complementary sources.

- Progress Report II. The main objective of this second report is to record both the work done in this last stage, and the conclusions that can be obtained from it. At the time of submitting this report, the TFG will be in its final phase as regards its development, and the student must have practically completed the proposed project. This report should include the following, at the least:

    - Indication of the level of monitoring for the foreseen planning, and of the adjustments made and/or planned, if deemed necessary, with their justification in the latter case.
    - General explanation of the methodology followed and changes made with respect to the initial proposal.
    - Presentation and evaluation of results.
    - Provisional conclusions.
    - Sources of information consulted.

Apart from the supervision provide, students will work independently on their TFGs.

Final phase

The TFG will culminate in a written report (the final report), in article format, and a public presentation and defence of the project. Students wishing to submit and defend their project should notify the tutor of this in the 4th obligatorymonitoring tutorial. In such a case, the tutor will mark the project as *Finished* on the computer monitoring application.

At the same time, from the *Submission* option that will have been activated when the tutor marks the project as *Finished*, the final report must be delivered (in pdf format) and all remaining fields should be completed, as required on form (title, summary and keywords in Catalan, Spanish and English, language of the document and authorisation for publication in the UAB's Digital Document Deposit).

For each submitted TFG, the TFG committee will appoint an evaluation committee, comprising three members of the lecturing staff, namely, the academic tutor (whenever possible) and two additional members from the areas of knowledge relating to the Grade. With a minimum of three calendar days in advance, the commission will also establish the date and place for presenting/defending the TFG.

The final report. This will be written in article format and must be between 8 and 10 pages providing an explanation of the project, acknowledgments and bibliography. Up to 4 additional pages can be added to include appendix material. Students must strictly follow the publication format (based on that proposed by the IEEE Computer Society) and must include at the least the following content: objectives, state of the art, methodology, results, conclusions and bibliography. The report must be free from error, precise and synthetic in its use of language. The final report will be assessed by the evaluation committee (which will be the same for the public defence); the grade awarded is the average grade given in the committee's constituent-member assessments. An evaluation rubric has been established for this purpose.

Public presentation and defence: The student will present the project in a clear and orderly manner to the evaluation committee. Under nocircumstances can this presentation exceed 15 minutes, It is then followed by a questions from the evaluation committee that will take, at most, an additional 15 minutes. TFG presentations will be organised in sessions in which members of the same committee will evaluate various presentations. An evaluation rubric will be used for this assessment. The final presentation grade is the average grade given in the committee's constituent-member assessment, and will be made public at the end of each session.

The TFG monitoring application provides the specifications of format and content for the distinct reports, as well as indicating the characteristics of the presentation. It also provides the rubrics with which each of the activities will be evaluated.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Supervised			
Monitoring tutorial sessions with the tutor	9	0.36	
Preparation of all documentation (initial, monitoring, final and defence documentation)	30	1.2	
Type: Autonomous			
Development of the project	260	10.4	

Assessment

The TFG evaluation consists of two parts:

1. Tutor assessment (weighting: 40% of the grade). The tutor will evaluate the reports and materials that have been produced throughout the project (TFG dossier), emphasising the manner in which the project has evolved, and fulfilment of the objectives established. This evaluation is continuous and training-oriented. For each one of the submitted activities, a provisional grade will be awarded; this will not be deemed definitive for the overall TFG grade until the final submission. Each activity consists of certain items that must obligatorily be evaluated as they contribute to the final grade; items that can be optionally evaluated so as to provide students with an indication of their progression; and items that are not evaluated. The definitive grade for each item will be that given in the final activity evaluated by the tutor. All activities are obligatory, to be submitted on the dates specified by coordination. Submission outside established deadlines may be accepted if justifiable causes can be demonstrated. However, any such delay may negatively affect the grade given by the tutor.

2. TFG evaluation-committee assessment (weighting: 60% of the grade). The assessment committee consists of three members of the lecturing staff who will evaluate both the final report (30%) and the public presentation of the project (30%). If possible, the tutor will be part of the committee. Each member will indicate their grade and the average of these grades will be calculated to obtain the final grade awarded.

Evaluation rubrics will be used for each of the activities to ensure greater objectivity and traceability for all awarded grades. These rubrics will be available in the TFG monitoring application.

The final TFG grade will be decided by the evaluation committee and will also include the tutor's grade. To pass the subject, students must have, at least, 50% of the grade awarded by both the tutor and the evaluation committee. The final grade will be the weighted average of these two grades. Students who does not attain 50% of the available grade in each part of the assessment will be awarded a final grade of 'Fail', with a corresponding numerical note inferior to 5.0.

The evaluation committee may propose the distinction of "With Honours" to any one or several projects, provided that, in the final evaluation, such projects shall have obtained a grade equal to or greater than 9.0.

Since the number of these mentions cannot exceed five percent of the students enrolled in the subject, in case the number of TFG candidates for honors is greater than the maximum possible number, they will be awarded to the proposed TFGs with the highest marks until reaching the maximum number allowed.

If the TFG is not successfully completed, students in question need to re-register and start the process again. In the event that the student concerned and the tutor are in agreement on this matter, the same project may be proposed again.

The final grade will be "Not evaluable" only in the event that no reports shall have been submitted.

If it can be demonstrated that any part of the TFG has been plagiarised and/or produced by a third party other than the registered student, this will automatically result in a fail grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1- Tutor evaluation	40%	0	0	1, 11, 15, 14, 3, 4, 2, 5, 6, 19, 7, 8, 9, 10, 12, 13, 18, 17, 16
2- Final report (Evaluation Committee)	30%	0	0	3, 2, 19, 9, 10, 18, 17
3- Presentation and Defence (Evaluation Committee)	30%	1	0.04	11, 3, 4, 2, 5, 19, 10, 17

Bibliography

General references:

- Alley, M. (2013). The craft of scientific presentations: critical steps to succeed and critical errors to avoid. Springer-Verlag. [Recurs electrònic] (http://www.writing.engr.psu.edu/csp.html)
- Alley, M. (1996). The craft of scientific writing. 3e. Springer-Verlag. (http://writing.engr.psu.edu/csw.html)
- Dawson, C.W. (2009). Projects in Computing and Information Systems. 2e. Addison Wesley.

Specific references:

- It will be provided by tutor depending on the work.

Software

The one required to do the project.