Universidad de Alcalá

TEACHING GUIDE

Tools for Simulation Engineering

Transversal Subject

University of Alcalá

Academic Year 2026/27

1st Semester

Approved by the EPS School Board on June 15th, 2026

TEACHING GUIDE

Name of the subject:	**Tools for Simulation Engineering**
Code:	**100181**
Degrees:	
Department / Teaching Area:	**Electronics / Electronics Technology**
Type:	**Transversal**
ECTS credits:	**6**
Year and semester:	**1st semester**
Teachers:	**Sirona Valdueza Felip (Coordinator)**
Office hours:	**To be agreed by email.**
Language:	**Spanish/English**

1. COURSE SUMMARY

The objective of Tools for Simulation Engineering module is to introduce the main software tools for modelling, simulation, calculus and analysis useful in many areas related with engineering field. The students will understand the potential of these tools to solve different engineering problems that they will find in many modules of the curriculum.

A list of this kind of tools will be shown and one of them will be deeply studied: Matlab. Nowadays, it is one is of the most powerful, professional and multidisciplinary tools on the market and it is available for all the UAH students. Matlab is also used in practical implementation of the theoretical content of many modules of engineering courses.

2. SKILLS

2.1. Transversal skills

This course contributes to the acquisition of the following transversal competences defined by the Technical Quality Unit (UTC) of the UAH:

TRU1: Capacity for analysis and synthesis.
TRU2: Speaking and writing skills (native language).
TRU3: Ability to look for information from different sources.
TRU4: Autonomous learning skills.
TRU5: Ability to work independently and in a team.

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2.2. General skills

CG3. To know the resources available for accessing information and to use them effectively.
CG4. To use all types of computer applications and electronic resources effectively.
CG5. To communicate your own ideas clearly, both in professional and non-professional contexts.
CG6. To plan and carry out research in a given field of study, in accordance with the academic and scientific requirements that are specific to it.

2.3. Learning outcomes

On successful completion of this course, students will be able to do the following:

RA1. To reach a sufficient level to be able to continue learning, now in an autonomous way, other more advanced aspects of Matlab and other similar simulation and calculation tools for engineering.
RA2. To analyse and solve engineering problems with initiative and creativity with the support of simulation and calculation tools.

3. CONTENTS

Module contents	Total number of classes, credits or hours
Unit 1: Simulation tools. Definitions and types. Commercial tools, comparison.	0,5 ECTS
Unit 2: Introduction to Matlab. Matlab workspace. Basic operations with Matlab. Manipulation of vectors and matrices. Practical case study.	1 ECTS
Unit 3: Graphics. Representation of data and functions. Visualisation of data and functions. Practical case study.	0,75 ECTS
Unit 4: Basic programming. Functions and scripts. Control structures. Practical case study.	0,75 ECTS
Unit 5: Algorithms. Symbolic language. Data processing. Practical case study.	1,5 ECTS
Unit 6: Applications. GUI graphic interface. Models (mathematical, electrical...). Reports. Practical case study.	1,5 ECTS

4. TEACHING METHODOLOGIES AND LEARNING ACTIVITIES

4.1. Credits distribution (specified in hours)

Face-to-face class hours:	45 h
Number of hours of the student's own work:	105 h
Total hours:	150 h

4.2. Methodological strategies, teaching materials, and didactic resources

1. Guided lessons combining lectures and practical use of the software by the students.
2. Group and individual tutorships according to the needs of the student/group. Whether individually or in small groups, these tutorships will help to resolve doubts and consolidate the knowledge acquired. In addition, they will help to carry out an adequate follow-up of the students and to evaluate the good functioning of the teaching-learning mechanisms.

In addition, the following complementary resources, among others, may be used:

- Individual or group work: in addition to its completion, the corresponding public presentation to the rest of the classmates in order to encourage debate.
- Attendance at conferences, meetings or scientific discussions related to the subject.

Throughout the course, students will be offered activities and tasks, so that they can consolidate the concepts acquired by experimenting both individually and in groups.

In order to carry out the exercises, the student will have at his/her disposal in the laboratory a place with the necessary equipment (applications and specific material to carry out the exercises).

Throughout the learning process in the subject, the student will have to use different bibliographic or electronic sources and resources.
The teaching staff will provide their own materials developed specifically for this course so that the student can meet the objectives of the subject and achieve the expected competences.

Finally, all the development of the course will be detailed in detail in the virtual classroom of the course. All the materials developed for the subject and all the

information that the teachers consider appropriate for the correct teaching-learning process will be available there.

5. EVALUATION: Procedures, assessment criteria and grading system

5.1. Assessment criteria

The objective of the evaluation process is to analyze which competencies the student has acquired and to what degree. Consequently, the evaluation process will focus on verifying that the student has acquired the expected competencies and skills, namely:

- CE1: To achieve a sufficient level of knowledge of Matlab to process, analyze and visualize data.
- CE2: To analyze and solve engineering problems with initiative and creativity with the support of simulation and calculation tools.

Students will be continuously evaluated through Practical Continuous Assessment Tests (LAB) distributed throughout the semester. These tests will serve to detect the student's strengths and weaknesses, so that it will be possible to reorient those students who are not acquiring the expected abilities and skills. Once the process is concluded, students will have a Final Evaluation Test (PC) that will serve to determine the degree to which they have acquired the foreseen capacities and skills.

5.2. Assessment process

In accordance with the aforementioned criteria, the performance of practical laboratory exercises is an essential element for the acquisition of the subject's objective competences.

Consequently, attendance at the practical sessions and passing the tests related to this part of the course will be considered an essential element of the evaluation in the case of continuous assessment. In the case of final assessment, these tests will be replaced by one or more practical exercises that students must hand in according to the timetable provided at the beginning of the course. In the same way, in extraordinary exams, students must submit one or more practical exercises to cover the competences of this part of the course.

Likewise, since passing the assessment criteria established for the laboratory does not guarantee an adequate level in all the competences corresponding to the subject, it is considered that passing the programmed theoretical-practical tests is also an essential element of the assessment, both in the ordinary and extraordinary exams, and in the two forms of assessment foreseen: continuous and non-continuous.

Consequently, in order to pass the subject, the student must demonstrate an appropriate minimum level of knowledge and skills in both groups of tests (theoretical-practical and experimental). Such minimum levels are set out in the marking criteria (section 6.4).

The evaluation process is based on continuous assessment of the student. However, students will have a period of fifteen days to request in a letter to the Director of the Higher Polytechnic School their intention to opt for the final assessment model, stating the reasons they deem appropriate. The assessment of the learning process of all students who do not submit a request in this respect or whose request is denied will be carried out, by default, in accordance with the continuous assessment model.

The contents and timing of the assessments will be detailed at the beginning of the course.

The tests and assessment procedures corresponding to the ordinary and extraordinary exams are detailed below.

A. Ordinary call:

A.1. Continuous assessment:

a) To take the different assessment tests established throughout the course. All the tests will have the same weight for the purposes of marking.
b) To take a theoretical-practical test with several questions (analysis and/or synthesis) referring to specific aspects of the syllabus covered.

A.2. Final assessment.

Students who opt for the final assessment must pass a final exam with the following contents:

a) A theoretical-practical test that will broadly cover the contents of all the subjects of the course (PEF).
b) A practical laboratory test, which will cover the objectives programmed in the corresponding part of the subject (PP).

B. Extraordinary call:

B.1. Continuous assessment:

For students who have participated in the continuous assessment process and have not passed it satisfactorily, the extraordinary exam will consist of:

(a) A theoretical-practical test that will broadly cover the contents of all the subjects of the course (PEF).
b) A practical laboratory test, which will cover the objectives programmed in the corresponding part of the subject (PP).

B.2. Non-continuous assessment:

The marking procedure for this type of assessment shall be identical for both examinations.

5.3. Assessment tools

This section specifies the assessment tools that will be applied to each of the assessment criteria:

1. Practical laboratory exercises (LAB). These will consist of practical activities that will be proposed throughout the course and with which the student is expected to put into practice the contents of the course. Each activity will be assessed separately.
2. A final overall test (PC) which will have two parts, one part with theoretical questions (PC1) and one part with several questions (of analysis and/or synthesis) referring to specific aspects of all the contents and activities covered by the subject (PC2).

5.4. Assessment criteria

This section quantifies the assessment criteria for passing the course.

A. **Ordinary call**:

A.1. **Continuous assessment**: the relationship between the criteria, the instruments and the qualification is as follow:

Skill	Learning Outcome	Assessment criteria	Assessment tool	Weight in the final mark
TRU1, TRU2, CG3, CG4, CG5	RA1, RA2	CE1,	PC: PC1, PC2	70%
TRU1, TRU2, TRU3, TRU4, TRU5, CG5, CG6	RA2	CE1, CE2	LAB	30%

The 30% assigned to the LAB assessment tool will be obtained by taking the arithmetic mean of all the laboratory tests.

In order to pass the continuous assessment, students must fulfil the following conditions:

- To satisfactorily pass the evaluation of the competences related to both the theoretical and practical parts of the subject. It will be understood that a student satisfactorily acquires these competences if he/she attends the sessions in which the practical exercises are proposed and carried out and his/her grade in the set of related tests (LAB) is higher than 50% of the maximum possible grade.
- To satisfactorily pass the evaluation of the competences related to the theoretical-practical part of the subject. It will be understood that a student satisfactorily acquires these competences if his/her average mark in the two parts of the test described above (PC1 and PC2) is equal to or higher than 50 % of the maximum possible mark.
- In the case of having passed the two previous parts, to obtain an overall weighted mark equal to or higher than 5/10.
- In the case of failing any of the two parts, the student's final grade will be the lower of the following:
    - The weighted sum of all the marks.
    - 4/10 points, if the result of the weighted sum is higher than this value.

Qualification as "Not Presented"

The student within the continuous assessment model who does not participate in the evaluation process will be graded as "Not Presented" in the ordinary exam session. It will be understood that the student has not participated in the continuous assessment process if he/she does not take any of the overall tests (PC1 or PC2).

A.2. **Final assessment**, whose criteria, instruments and qualification are as follows:

Skill	Learning outcomes	Assessment criteria	Assessment tool	Weight in the final mark
TRU1, TRU2, CG3, CG4, CG5	RA1, RA2	CE1,	PEF	80%
TRU1, TRU2, TRU3, TRU4, TRU5, CG5, CG6	RA2	CE1, CE2	PP	20%

Qualification as "Not Presented"

Students within the final assessment model who do not participate in the evaluation process will be graded as "Not Presented" in the ordinary exam session. It will be understood that the student has not participated in the final assessment process if he/she does not take any of the tests (PEF or PP).

B. Extraordinary call:

B.1. **Continuous assessment:**

For those students who, having participated in the continuous assessment process, have not passed it satisfactorily, the extraordinary exam will consist of:

Skill	Learning outcome	Assessment criteria	Assessment tool	Weight in the final mark
TRU1, TRU2, CG3, CG4, CG5	RA1, RA2	CE1,	PEF	80%
TRU1, TRU2, TRU3, TRU4, TRU5, CG5, CG6	RA2	CE1, CE2	PP	20%

Qualification as "Not Presented"

Students within the continuous assessment model who do not participate in the evaluation process will be graded as "Not Presented" in the ordinary exam session. It will be understood that the student has not participated in the continuous assessment process if he/she does not take any of the tests (PEF or PP).

B.2. **Final assessment**. The grading criteria for this type of assessment will be identical for both rounds.

5.5. Characteristics of continuous assessment tests

The Continuous Assessment tests have the following characteristics:

- They allow the student to know throughout the learning process, with real and objective evidence, what the evaluation and qualification criteria are.
- They allow the student to know at regular intervals the results of the learning process he/she has carried out, as well as the competences and skills acquired.
- They provide the teaching staff with a measure of the quality of the process of implementation and development of the subject.

- They may not free up material for the final examination, since the aim of the final examination is to assess the overall acquisition of the subject's target competences.

6. BIBLIOGRAPHIA

- Matlab Primer: https://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf
- Antonio Souto Iglesias, “Curso básico de programación en MATLAB”, Ed. Tebar 2ª Edición (2016).
- Timmy Siauw, Alexandre Bayen, “An introduction to MATLAB programming and numerical methods for engineers”, Oxford Academic Press (2015).

Disclosure Note

During the evaluation tests, the guidelines set out in the Regulations establishing the Rules of Coexistence of the University of Alcalá must be followed, as well as the possible implications of the irregularities committed during said tests, including the consequences for committing academic fraud according to the Regulation of Disciplinary Regime of the Students of the University of Alcalá.