



# Faculty of Business Science and Tourism

## GENERAL SPECIFICATIONS

ACADEMIC YEAR 2025-2026

### DEGREE IN FINANCE AND ACCOUNTING

#### Subject Data

<b>Name:</b>			
ECONOMETRÍA FINANCIERA			
<b>English name:</b>			
FINANCIAL ECONOMETRICS			
<b>Code:</b>	<b>Type:</b>		
858610308/ 859110320	Elective		
<b>Hours:</b>			
	<b>Total</b>	<b>In class</b>	<b>Out class</b>
<b>Time distribution</b>	150	45	105
<b>ECTS:</b>			
<b>Standard group</b>	<b>Small groups</b>		
	<b>Classroom</b>	<b>Lab</b>	<b>Practices</b>
4.8			1.2
<b>Departments:</b>	<b>Knowledge areas:</b>		
Economics	Quantitative methods for economics and business		
<b>Year:</b>	<b>Semester</b>		
4 <sup>th</sup>	I <sup>st</sup>		

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**TEACHING STAFF**

Name:	E-mail:	Telephone
Ramón Jiménez Toribio	<a href="mailto:toribio@uhu.es">toribio@uhu.es</a>	959 217 871
David Castilla Espino	<a href="mailto:david.castilla@dehie.uhu.es">david.castilla@dehie.uhu.es</a>	959 217 868

**Others Data (Tutoring, schedule... )**

Group	Day and time	Dates
TI- II	Tuesday and Thursday, from 10:30 to 12:30	Large (36 hours) and small (9 hours) groups dates and timetable available on the Moodle site for the course.

Prof.: Dr. Ramón Jiménez Toribio (coordinator)

Department: Economics

Office: 63 (Faculty of Business Science and Tourism)

Office hours: <http://goo.gl/dH7sB4>

First semester				
Monday	Tuesday	Wednesday	Thursday	Friday
		10:45-12:30		9:15-13:30
Second semester				
Monday	Tuesday	Wednesday	Thursday	Friday
			12:30-14:15	9:15-13:30

Prof.: Dr. David Castilla Espino

Department: Economics

Office: 62 (Faculty of Business Science and Tourism)

Office hours: <http://goo.gl/F3z3K>

First semester				
Monday	Tuesday	Wednesday	Thursday	Friday
	8:30-10:30		8:30-10:30	
Second semester				
Monday	Tuesday	Wednesday	Thursday	Friday
	10:30-13:30		10:30-13:30	

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### SPECIFIC INFORMATION OF THE COURSE

#### 1. Contents description:

##### 1.1 In English:

- Asset predictability using time series techniques.
- Stock index models: estimation of beta and expected return.
- Market microstructure.
- Volatility models.
- Estimation of option models using continuous time processes.
- Study of events. Models for normal returns. Tests for abnormal returns.
- Risk measures.

##### 1.2 In Spanish:

- Predictabilidad de los Activos mediante técnicas de series temporales.
- Modelos de índices bursátiles: estimación de la beta y de la rentabilidad esperada.
- Microestructura de los mercados.
- Modelos para la Volatilidad.
- Estimación de modelos de opciones mediante procesos temporales en tiempo continuo.
- Estudio de sucesos. Modelos de rendimientos normales. Contrastes para rendimientos anormales.
- Medidas del riesgo.

#### 2. Background:

##### 2.1 Situation within the Degree:

It is an elective subject of the last year of the Degree in Finance and Accounting. It provides basic knowledge in Econometrics applied to the analysis of financial markets.

##### 2.2 Recommendations

To have knowledge of Statistical Inference and Econometrics.

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### 3. Objectives (as result of teaching):

#### GENERAL OBJECTIVES

On completion of this course students should be able to:

- demonstrate an understanding of the fundamental concepts and methods in financial econometrics.
- describe different types of financial data and specify different methods for their analysis.
- apply critical thinking to the use of financial time series and evaluate the potential of different techniques.

#### SPECIFIC OBJECTIVES

Students successfully completing this course will be able to:

- apply univariate time-series techniques to analyse time series of financial products and markets.
- develop models of stochastic volatility and evaluate their usefulness.
- contrast this set of techniques with the possibilities offered by computer programs and, more specifically, modern statistical and econometric software.

### 4. Skills to be acquired

#### 4.1 Specific Skills:

#### 4.2 General, Basic or Transversal Skills:

(BC1) Demonstrate to understand and have acquired knowledge about an area of study that starts from basic Secondary Education, and is often supported by advanced textbooks, but also includes some aspects that involve knowledge related to the forefront of their field of study.

(BC2) Know how to apply their knowledge to their work or vocation in a professional way. They should also possess the skills that are usually demonstrated through the elaboration and defence of arguments and in problem solving within their area of study.

(BC3) Gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.

(BC4) Be able to convey information, ideas, problems and solutions to both specialised and non-specialised audiences.

(BC5) Develop the learning skills required to undertake further studies with a high degree of autonomy.

(GC1) Develop cognitive, instrumental and attitudinal competences in the context of Finance and Accounting.

(TC1) Be completely fluent in Spanish, mastering the different styles and the specific languages required to develop and communicate the acquired knowledge in the scientific and academic environment.

(TC2) Develop a critical attitude, being able to analyse and synthesize.

(TC3) Develop an attitude of inquiry that permanently enables to review and deepen in the knowledge.

(TC4) Acquire Computer and Information Skills (CI2) and apply them working.

(TC6) To promote, respect and safeguard human rights, democratic values, social equality and environmental sustainability, without discrimination on the basis of birth, race, sex, religion, opinion or other personal or social circumstances.

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<b>5. Training Activities and Teaching Methods</b>	
<b>5.1 Training Activities:</b>	
<ul style="list-style-type: none"> <li>- Theoretical/practical classes about the contents of the syllabus.</li> <li>- Supervised activities by lecturers: seminars, conferences, development of assignments, debates, group tutorials, assessment/self-assessment activities.</li> <li>- Individual / autonomous work of the student.</li> </ul>	

<b>5.2 Teaching Methods:</b>	
<ul style="list-style-type: none"> <li>- Face-to-face theoretical classes.</li> <li>- Face-to-face practical classes.</li> <li>- Autonomous supervised work of the student.</li> <li>- Assessment tests.</li> <li>- Tutorials.</li> </ul>	

<b>5.3 Development and Justification:</b>																
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 5px;"><b>Methodology</b></th> <th style="text-align: center; padding: 5px;"><b>Activity</b></th> <th style="text-align: center; padding: 5px;"><b>Description</b></th> <th style="text-align: center; padding: 5px;"><b>No. of hours</b></th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="vertical-align: top; padding: 10px;">           Face-to-face classes about the theoretical and practical contents of the course.         </td> <td style="padding: 10px;">           Theoretical classes (Large groups)         </td> <td style="padding: 10px;">           Lectures by teachers, in which the participation of students in the classroom (discussions) is encouraged. Foundations and theoretical approaches            Presentation and discussion of reports by students         </td> <td style="text-align: center; padding: 10px;">           36         </td> </tr> <tr> <td style="padding: 10px;">           Practical classes (Small groups)         </td> <td style="padding: 10px;">           Problems and case studies: approaches and solutions to specific problems related to the subject.            Development of IT skills for subject-specific software.         </td> <td style="text-align: center; padding: 10px;">           9         </td> </tr> <tr> <td style="vertical-align: top; padding: 10px;">           Individual / autonomous work of the student         </td> <td style="padding: 10px;">           Individual preparation of essays on theory and practical applications (following tutor's suggestions). Autonomous study of subject contents.         </td> <td style="padding: 10px;">           Documentation.            Background reading, e.g. articles.            Use of IT.            Problem solving and case-study preparation.            Theoretical (concepts and principles) and practical contents of the subject.            Students independently explore topics not covered by lectures.         </td> <td style="text-align: center; padding: 10px;">           105         </td> </tr> </tbody> </table>		<b>Methodology</b>	<b>Activity</b>	<b>Description</b>	<b>No. of hours</b>	Face-to-face classes about the theoretical and practical contents of the course.	Theoretical classes (Large groups)	Lectures by teachers, in which the participation of students in the classroom (discussions) is encouraged. Foundations and theoretical approaches Presentation and discussion of reports by students	36	Practical classes (Small groups)	Problems and case studies: approaches and solutions to specific problems related to the subject. Development of IT skills for subject-specific software.	9	Individual / autonomous work of the student	Individual preparation of essays on theory and practical applications (following tutor's suggestions). Autonomous study of subject contents.	Documentation. Background reading, e.g. articles. Use of IT. Problem solving and case-study preparation. Theoretical (concepts and principles) and practical contents of the subject. Students independently explore topics not covered by lectures.	105
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All the necessary material to follow the theoretical and practical classes will be available on the online (distance) learning platform Moodle (<https://moodle.uhu.es>). The page will contain information about the contents of the subject, the work plan, the schedule of lectures and practical sessions, as well as items of interest about the subject.

Lectures will involve the use of the whiteboard (traditional and electronic versions), computer presentations and supplementary material provided by the lecturer (photocopies, electronic files, etc.). The practical sessions will seek to apply the material covered in the lectures, with an emphasis on solving problems, evaluating the limitations and advantages of the techniques, and developing a critical analysis of the results obtained. These practical sessions will be interactive and the participation of students will be taken into account when assessing their learning outcomes.

A significant part of the practical classes will take place in the computer room in order that students acquire the requisite skills for using these tools in the field of statistical analysis of economic and financial data. The preferred software in these classes is

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open-source, though proprietorial software will also be introduced because of its widespread use in the labour market. Supervised academic activities will also include student attendance at seminars (in Spanish or another language) or viewing of/listening to multimedia content (in Spanish or another language) related to the subject, for which they will produce reports with the aid of worksheets designed to test their understanding and guide their responses. Activities may also include students solving problems on the board or in a written report; the use of problem-based instrumental methodological approaches in collaborative groups supervised by lecturers in specific workshops; the use of case studies; and participation in forums about the subject, moderated by the lecturer.

These supervised academic activities aim to involve a variety of skills associated with this methodological approach, such as promoting the use of a foreign language, making use of the resources that the university offers students, developing autonomous learning, practising skills for problem solving in the field of finance, economics and business, working effectively in a team, planning and organising one's work, and organising the selection and collection of statistical financial information.

### 6. Detailed Contents

#### **UNIT 1. BASIC CONCEPTS IN TIME SERIES**

- 1.1 Characteristics of time series: stationary stochastic processes
- 1.2 Transformations to stationarity
- 1.3 Wald theorem: linear ARMA models
- 1.4 The autocorrelation function and the correlogram
- 1.5 Linear ARMA models
- 1.6 Estimation and testing
- 1.7 Prediction

#### **UNIT 2. UNOBSERVED COMPONENT MODELS**

- 2.1 Description and properties
- 2.2 Kalman filter
- 2.3 Estimation of the parameters: Maximum Likelihood.
- 2.4 Estimation of unobserved components: filtering and smoothing.

#### **UNIT 3. GARCH MODELS**

- 3.1 Empirical properties of financial time series
- 3.2 Properties of GARCH(1,1) model
- 3.3 Maximum Likelihood estimation
- 3.4 Prediction
- 3.5 Extensions
  - 3.5.1 GARCH in mean
  - 3.5.2 Leverage effect
  - 3.5.3 Long memory

#### **UNIT 4. STOCHASTIC VOLATILITY MODELS**

- 4.1 Properties of ARSV(1) model
- 4.2 Comparison with GARCH(1,1) model
- 4.3 Estimation
  - 4.3.1 Method of moments
  - 4.3.2 Quasi Maximum Likelihood
  - 4.3.3 MCMC
- 4.4 Prediction
- 4.5 Extensions
  - 4.5.1 Leverage effect
  - 4.5.2 Long-memory

#### **UNIT 5. MULTIVARIATE MODELS**

- 5.1 VAR Models. Cointegration
- 5.2 Multivariate GARCH models
- 5.3 Multivariate Stochastic Volatility models

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### 7. Bibliography

#### 7.1 Basic Bibliography:

- Brooks, C., (2002), *Introductory Econometrics for Finance*, Cambridge University Press.
- Greene, W. H., (2003), *Análisis Econométrico*, Prentice Hall.
- Hamilton, J. D., (1994), *Time Series Analysis*, Princeton University Press.
- Novales, A., (1993), *Econometría*, McGraw-Hill.
- Peña, D., (2010), *Análisis de Series Temporales*, Alianza Editorial.
- Pérez, C., (2006), *Econometría de las Series Temporales*, Prentice Hall.

#### 7.2 Additional Bibliography:

#### SPECIFIC REFERENCES

- Ait-Sahalia, Y. and L. P. Hansen, (2009), *Handbook of Financial Econometrics*, 2 Volumes, North-Holland.
- Asteriou, D. and S. G. Hall, (2007), *Applied econometrics: a modern approach using EViews and Microfit*, rev. ed., Palgrave Macmillan.
- Bauwens, L. et al., (2007), *High Frequency Financial Econometrics: Recent Developments*, Physica Verlag.
- Campbell, J. et al., (1997), *The Econometrics of Financial Markets*, Princeton University Press.
- Fabozzi, F. J., (2007), *Financial Econometrics: From Basics To Advanced Modeling Techniques*, Wiley & Sons Ltd.
- Fabris, J., (2009), *Econometría Financiera. Modelos y Pronósticos Utilizando Qms Eviews*, Buenos Aires: Omicron Systems.
- Gourieroux, C. Y. and J. Jasiak, (2001), *Financial Econometrics*, Princeton University Press.
- Gregoriou, Greg N.; Pascalau, Razvan, (2010), *Financial Econometrics Modeling. Derivatives Pricing, Hedge Funds And Term Structure Models*, Palgrave.
- Mills, C.T., (1999), *The Econometric Modelling of Financial Time Series*, Cambridge University Press.
- Taylor, S., (2005), *Asset Price Dynamics, Volatility and Prediction*, Princeton University Press.
- Tsay, R. S., (2005), *Analysis of Financial Time Series*, John Wiley and Sons.
- Wang, P., (2008), *Financial Econometrics*, Routledge.

#### OTHER ONLINE SOURCES OF INFORMATION

- St. Louis Reserve Economic Data: <https://fred.stlouisfed.org/>
- The World Bank: <https://www.worldbank.org/>
- IMF: <http://www.imf.org/>
- Banco de España: <http://www.bde.es/>
- OECD: <http://www.oecd.org/>
- European Central Bank: <http://www.ecb.int/>

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<b>8. Systems and Assessment Criteria</b>			
<b>8.1 System for Assessment:</b>			
<ul style="list-style-type: none"> <li>- Written/oral exam.</li> <li>- Continuous assessment.</li> </ul>			
<b>8.2 Assessment Criteria and Marks:</b>			
<b>8.2.1 Examinations Convocatory I</b>			
<b>Assessment form</b>	<b>Description</b>	<b>Criterium</b>	<b>Weight on the final mark</b>
Written exam	Individual theoretical and practical test, in which the theoretical, practical and methodological knowledge will be assessed	<ul style="list-style-type: none"> <li>• Ability to solve problems and apply the theoretical contents to practice.</li> <li>• Ability to summarise.</li> <li>• Knowledge and understanding of the contents.</li> <li>• Absence of errors.</li> <li>• Appropriate use of concepts and terminology.</li> <li>• Internal coherence of the exercise and between it and all the knowledge.</li> <li>• Correctness in the use of spelling, grammar and syntax.</li> <li>• Ability to interrelate theories, models and concepts.</li> <li>• Precision and accuracy of the answers.</li> <li>• Capacity of students to plan, develop and present an empirical work on different facets of the subject.</li> <li>• Oral and written communication ability of the student.</li> <li>• Ability to use software and information-communication technologies.</li> <li>• Use of the educational media of the University of Huelva available to students.</li> </ul>	Theory (25%) Problem solving and application of econometrics to finance (45%)
Continuous assessment	Continuous assessment can consist of: <ul style="list-style-type: none"> <li>• Written and oral tests.</li> <li>• Empirical works on different aspects of the subject and their presentation.</li> <li>• Different types of practical assignments.</li> <li>• Active participation in seminars, workshops and other activities related to course contents.</li> <li>• Other activities and tests to reach learning objectives of the course.</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to solve problems and apply the theoretical contents to practice.</li> <li>• Ability to summarise.</li> <li>• Knowledge and understanding of the contents.</li> <li>• Absence of errors.</li> <li>• Appropriate use of concepts and terminology.</li> <li>• Internal coherence of the exercise and between it and all the knowledge.</li> <li>• Correctness in the use of spelling, grammar and syntax.</li> <li>• Ability to interrelate theories, models and concepts.</li> <li>• Precision and accuracy of the answers.</li> <li>• Capacity of students to plan, develop and present an empirical work on different facets of the subject.</li> <li>• Oral and written communication ability of the student.</li> <li>• Ability to use software and information-communication technologies.</li> <li>• Use of the educational media of the University of Huelva available to students.</li> </ul>	30%

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The set of evaluation activities shall be subject to the Policy of Evaluation for undergraduate and postgraduate degrees at the Universidad de Huelva (the Governing Council of March 13, 2019): [https://www.uhu.es/fexp/archivos/normativa/REGLAMENTO\\_DE\\_EVALUACION\\_aprobado\\_en\(CG13\\_de\\_marzo\\_2019\).pdf](https://www.uhu.es/fexp/archivos/normativa/REGLAMENTO_DE_EVALUACION_aprobado_en(CG13_de_marzo_2019).pdf)

### Rating system

The rating system used in this subject is in accordance with that set out in article 5 of Royal Decree 1125/2003, of September 5, which establishes the European credit system and the grading system for official university degrees and which is valid in all Spain. Results obtained by the student in each subject of the curriculum will be graded according to the following numerical scale from 0 to 10, with one decimal place, to which may be added the corresponding qualitative rating:

- 0.0 to 4.9: D. Fail (Suspensu)
- 5.0 to 6.9: Grade C (Aprobado)
- 7.0 to 8.9: Grade B (Notable)
- 9.0-10: Grade A (Sobresaliente)

The weighted average of the marks obtained by the student in the different types of assessment described in the previous table must be at least 5 in order to pass the subject. In those cases in which more than one activity is evaluated for a specific type of assessment, all of them will be weighted proportionally to the part of contents included in each of them.

The written exams that evaluate the theoretical and practical contents can be passed throughout the course by means of periodic exams if the lecturers consider it appropriate. They will be weighted proportionally to the part of contents included in each of them. In the case of a pass, they will substitute the final written exam in relation to the same content.

A practical application will be used by software in the computer classroom as a complement to the written exam and in substitution of the continuous evaluation and/or course work, in the resit exams that are listed below:

- Resit exam if continuous evaluation has not been passed.
- Resit exam in the following academic year, for students who choose a final single evaluation.
- Resit exam to complete a degree.
- Resit exam for students on mobility programmes.
- Final Appeal exam by special dispensation.

The student must prove the acquisition of all the skills related to the practical application by software in the computer room and must obtain a minimum grade of 3 to be able to pass the subject in which it will have a weight equivalent to the tests of continuous evaluation and/or course work shown in the previous table (30%).

The evaluation criteria used in the different activities will correspond in general with the competences related in this guide and, in particular, they are specified with no intention to be exhaustive in the following list:

- Ability to solve problems and apply the theoretical contents to practice.
- Ability to summarise.
- Knowledge and understanding of the contents.
- Absence of errors.
- Appropriate use of concepts and terminology.
- Internal coherence of the exercise and between it and all the knowledge.
- Correctness in the use of spelling, grammar and syntax.
- Ability to interrelate theories, models and concepts.
- Precision and accuracy of the answers.
- Capacity of students to plan, develop and present an empirical work on different facets of the subject.
- Oral and written communication ability of the student.
- Ability to use software and information-communication technologies.
- Use of the educational media of the University of Huelva available to students.

Those students who have a B (Notable) final grade in the subject may request to increase their final grade to the coordinator of the subject. This will be done in writing to the Secretary Office of the Department. In this case, the teacher will suggest to the student an individual activity for that purpose. If the mark for this activity is equal to or greater than 5 on a numerical scale from 0 to 10, up to 2 points can be added to the student's final grade depending on the mark obtained in the activity up to a maximum grade of 10.

The mention "honors" will be awarded to students who have obtained a mark equal to or greater than 9.0. The number of mentions "honors" may not exceed 5% of the students registered in a subject in the same academic year, unless the number of students registered is less than 20, in which case, a single "honors" may be awarded.

For the calculation of the maximum number of honors, the number of students will be rounded up to the next highest number and students from the University of Huelva who are studying at another university within the framework of a national or international mobility programme will not be considered for the calculation. These students' grades at the destination university will be recognised, regardless of whether the quota has been completed with students who take the subject at the University of Huelva.

When there is more than one student who meets the requirements to obtain the mention "honors" and the maximum number of mentions "honors" has been reached, the mention "honors" will be awarded to the one with the highest final grade. In those cases in which the students who opt for the mention "honors" have the same final grade, the lecturer will suggest to these students an activity consisting of the preparation of an essay or individual work so that a mention "honors" will be awarded to the student who has the highest score in this activity on a numerical scale from 0 to 10.

A student who decides not to take the written exam will be included in the record with the notation of Absent (No

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presentado).

Students have the right to take 2 out of 3 ordinary examinations. These exams have a maximum duration of three hours and must allow the evaluation of 100% of the subject.

**Ordinary examination I or course exam.** It will consist of a written exam according to the characteristics and weights described in the table presented at the beginning of this section. The mark of this exam will be computed by means of the weighted average of the grade obtained in continuous assessment and written exam, unless the student has opted for the final single evaluation test according to what is established in the Policy of Evaluation for undergraduate and postgraduate degrees at the Universidad de Huelva (the Governing Council of March 13, 2019). For the students to pass the subject it will be necessary that the weighted arithmetic mean is at least 5.

### 8.2.2 Examinations Convocatory II

**Ordinary examination II or resist exam.** It will consist of a written exam according to the characteristics and weights described in the previous section. The mark of this exam will be determined by means of the weighted average of the grade obtained in continuous assessment and the written exam, provided that the student has obtained a grade of at least 3 in continuous assessment and unless he has opted for the final single evaluation test as stated in the Policy of Evaluation for undergraduate and postgraduate degrees at the Universidad de Huelva (the Governing Council of March 13, 2019). Students will pass the subject if the weighted arithmetic mean of the different types of assessment is at least 5. If students do not exceed the minimum mark of 3 required in continuous evaluation, the tests of this examination will have the same structure as those for the final single evaluation test.

### 8.2.3 Examinations Convocatory III

**Ordinary examination III or resist exam in the following academic year.** The tests of this examination will have the same structure as those for the final single evaluation test.

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### 8.2.4 Extraordinary Convocatory

**Extraordinary examination.** The tests of this examination will have the same structure as those for the final single evaluation test.

### 8.3 Single Final Evaluation:

Students will be able to benefit from the final single evaluation when they send an email from their email account of the University of Huelva to the lecturer in the first two weeks of the subject or in the two weeks following enrollment if it has occurred after the beginning of the subject according to the Policy of Evaluation for undergraduate and postgraduate degrees at the Universidad de Huelva. This will imply the express waiver of the continuous evaluation and students will not be able to change to the other system. Nonetheless, in exceptional and duly justified cases, students will be able to apply for the final single evaluation outside the aforementioned deadlines, under the same administrative procedure.

The final single evaluation is carried out in a single academic act and will have a maximum duration of 3 hours. The final single evaluation will consist of a written exam with the characteristics and weights shown above and a practical application using software in computer rooms whose weight will be 30% (equivalent to the weight of continuous assessment and/or course work). It will be necessary to obtain a minimum grade of 3 in both parts that make up the final single evaluation and the weighted average of both tests is equal to or greater than 5 to pass 100% of the subject.