# Guía docente / *Course Syllabus*

## 2018-19

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### 1. Descripción de la Asignatura / *Course Description*

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| Asignatura<br>*Course* | MÉTODOS ESTADÍSTICOS Y ECONOMÉTRICOS EN LA EMPRESA (docencia en inglés) |
| Códigos<br>*Code* | 504018; 902035 |
| Facultad<br>*Faculty* | Facultad de Ciencias Empresariales |
| Grados donde se imparte<br>*Degrees it is part of* | Grado en Administración y Dirección de Empresas (Inglés); Doble Grado en Administración y Dirección de Empresas (Inglés) y Derecho |
| Módulo al que pertenece<br>*Module it belongs to* | Métodos cuantitativos |
| Materia a la que pertenece<br>*Subject it belongs to* | Métodos cuantitativos para la empresa |
| Departamento responsable<br>*Department* | Economía, Métodos Cuantitativos e Historia Económica |
| Curso<br>*Year* | 2º |
| Semestre<br>*Term* | 2º |
| Créditos totales<br>*Total credits* | 6 |
| Carácter<br>*Type of course* | Obligatoria |
| Idioma de impartición<br>*Course language* | Inglés |
| Modelo de docencia<br>*Teaching model* | C1 |

Clases presenciales del modelo de docencia C1 para cada estudiante: 23 horas de enseñanzas básicas (EB), 22 horas de enseñanzas prácticas y de desarrollo (EPD) y 0 horas de actividades dirigidas (AD). Hasta un 10% de la enseñanza presencial puede sustituirse por docencia a distancia (también presencial, pero posiblemente asíncrona), de acuerdo con la programación de la Asignatura publicada antes del comienzo del curso.

*Number of classroom teaching hours of C1 teaching model for each student: 23 hours of general teaching (background), 22 hours of theory-into-practice (practical group tutoring and skill development) and 0 hours of guided academic activities. Up to 10% of face-to-face sessions can be substituted by online teaching, in accordance with the course schedule published before it begins.*

## 2. Responsable de la Asignatura / *Course Coordinator*

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| Nombre<br>*Name* | Raúl Brey Sánchez |
| Departamento<br>*Departament* | Economía, Métodos Cuantitativos e Historia Económica |
| Área de conocimiento<br>*Field of knowledge* | Métodos Cuantitativos para la Economía y Empresa |
| Categoría<br>*Category* | Profesor Titular de Universidad |
| Número de despacho<br>*Office number* | 3.3.10 |
| Teléfono<br>*Phone* | 954977976 |
| Página web<br>*Webpage* | |
| Correo electrónico<br>*E-mail* | rbresan@upo.es |

## 3. Ubicación en el plan formativo / *Academic Context*

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| Breve descripción de la asignatura<br>*Course description* | According to the book Econometric Analysis (1988) by Professor W.H. Greene, "Econometrics is the field of Economics that concerns itself with the application of Mathematical Statistics and the tools of Statistical Inference to the empirical measurement of relationships postulated by Economic Theory". It means that Econometrics may be defined as a set of quantitative methods of evaluation, analysis, and prediction applied to Economics and based mainly on Mathematics, Statistics, and Economic Theory. However, over the time, the area of application of the econometric tools has been gradually broadening, and now is drawing towards the fields of Finance, Marketing, Business Administration and many others that belong to the area of Business and Economics. |
| Objetivos (en términos de resultados del aprendizaje)<br>*Learning objectives* | Advanced Statistic and econometric methods seem to be a necessary element of the education in the field of Business and Economics at the university level as it should provide students with an indispensable tool for the analysis of real-life situations that they are bound to face in their future profession. The aim of the course Statistical and Econometric Methods for Business is not only to familiarize the students with the essential statistical and econometric principles, especially those, related to different techniques of Multivariate Analysis and econometric regression model; but also to teach them to use them correctly and efficiently in their daily routine while working in the field of Business and Economics. Such objectives require that the students actualize, before taking the course if it is possible, their basic knowledge of Mathematics and Statistics (both descriptive and inferential) to guarantee the comprehension and successive use of the necessary advanced quantitative methods.<br>Besides that, it should be underlined that to base the teaching and learning of a subject as the one in question on the use of PC is no less than fundamental today. Therefore, numerous computer practice classes are planned for this course, the aim of these classes |

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| | is to achieve that the students acquire at least basic skills in operating some of the modern and most solicited, both in the market and in the field of teaching and research, specialized software, such as IBM SPSS Statistics and Econometric Views (EViews). |
| Prerrequisitos<br>*Prerequisites* | There are no prior requirements. |
| Recomendaciones<br>*Recommendations* | Although no formal prerequisite to enter into this course exists, to be able to follow the learning process the student should have some fundamental knowledge of Mathematics, Descriptive Statistics, Statistical Inference, and Economic Theory.<br>In particular, starting this course the students should possess a solid knowledge of the subjects that they have studied before within the Official Study Plan for this degree: matrix algebra and optimization (Mathematics for Business I and Mathematics for Business II), probability distribution, and Statistical Inference (Business Statistics and Business Statistics II), and notions of Economic Theory (Introduction to Economics, Microeconomics, and Macroeconomics). |
| Aportaciones al plan formativo<br>*Contributions to the educational plan* | Statistical and Econometric Methods for Business is a core curriculum course that comprises 6 credits (ECTS) and is offered in the 2nd semester of the 2nd year of studies of the Official Study Plan for the Degree in Business Administration and Management (GADE), as well as in the 2nd semester of the 3rd year of studies of the Official Study Plan for the Double Degree in Law, and Business Administration and Management (GADE-GD). The course is taught by the Academic Area of Quantitative Methods, which forms part of the Department of Economics, Quantitative Methods and Economic History.<br>For Business Administration and Management majors, this course is the top rung on the learning ladder leading to a comprehensive education in the fields of Statistics and Economics.<br>In the context of this Degree, the course is considered as providing the students with the basic knowledge of practical professional instruments. Here the previous knowledge of Mathematics, Statistics, and Economic Theory should be joined and put into practice to assure the students' capacity to design, evaluate, interpret, and foresee performance models determined by business and economic variables.<br>The course is designed to be primarily praxis-centred while paying proper attention to the role of theory as scaffolding. Within this broader context, special emphasis is placed on learning to use specialized software such as IBM SPSS Statistics and Econometric Views (EViews). |

## 4. Competencias / *Skills*

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| Competencias básicas de la Titulación que se desarrollan en la Asignatura<br>*Basic skills of the Degree that are developed in this Course* | CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio<br>CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética |

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| | CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado<br>CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía |
| Competencias generales de la Titulación que se desarrollan en la Asignatura<br>*General skills of the Degree that are developed in this Course* | CGI1 - Capacidad de análisis y síntesis<br>CGI2 - Capacidad de organización y planificación<br>CGI7 - Capacidad para la resolución de problemas.<br>CGI8 - Capacidad para tomar decisiones<br>CGI9 - Habilidad para analizar y buscar información proveniente de fuentes diversas<br>CGP1 - Capacidad para trabajar en equipo<br>CGP3 - Trabajo en un contexto internacional<br>CGP4 - Habilidad en las relaciones personales<br>CGP6 - Capacidad crítica y autocrítica<br>CGP8 - Trabajar en entornos de presión<br>CGS3 - Capacidad de aprendizaje autónomo<br>CGS4 - Creatividad<br>CGS5 - Motivación por la Calidad<br>CGS6 - Capacidad de Adaptación a nuevas situaciones<br>CGS8 - Liderazgo |
| Competencias transversales de la Titulación que se desarrollan en la Asignatura<br>*Transversal skills of the Degree that are developed in this Course* | CT1 - Comunicación oral y escrita en castellano.<br>CT2 - Comunicación oral y escrita en una lengua extranjera.<br>CT3 - Iniciativa y espíritu emprendedor.<br>CT4 - Conocimientos de informática relativos al ámbito de estudio.<br>CT5 - Capacidad para trabajar en entornos diversos y multiculturales.<br>CT6 - Compromiso ético en el trabajo.<br>CT7 - Sensibilidad hacia temas ambientales y sociales.<br>CT8 - Actuar de acuerdo con criterios de responsabilidad social, principios de igualdad de oportunidades entre hombres y mujeres, principios de igualdad de oportunidades y accesibilidad universal de las personas con discapacidad y los valores propios de una cultura de la paz y de valores democráticos. |
| Competencias específicas de la Titulación que se desarrollan en la Asignatura<br>*Specific competences of the Degree that are developed in the Course* | CE17 - Conocer las instituciones económicas y comprender el funcionamiento general de la economía en el corto, en el medio y en el largo plazo y el comportamiento de los agentes económicos. Comprender la utilización de los modelos económicos para hacer predicciones acerca del mundo real.<br>CE19 - Conocer las técnicas matemáticas y estadísticas básicas aplicadas al ámbito económico-empresarial, y analizar cuantitativamente la realidad económico-empresarial e Interrelacionar los conocimientos adquiridos en diversas materias de la titulación en el ámbito matemático, estadístico y de teoría económica |
| Competencias particulares de la asignatura, no incluidas en la memoria del título<br>*Specific skills of the Course, not included in the Degree's skills* | 4.1 Degree skills developed during the Course<br>- Self-learning;<br>- Ability to adapt to new environments;<br>- Creativity;<br>- Motivation for quality;<br>- Team work;<br>- Ability for personal relations;<br>- Critical and logic reasoning;<br>- Ethical compromise in work;<br>- Working under pressure;<br>- Analysis and synthesis; |

| | - Organization and planning;<br>- Oral and written communication in the English language;<br>- Usage of information technology;<br>- Searching for statistical information;<br>- Defining and solving specific problems about business and economic topics;<br>- Decision making.<br><br>4.2. Module skills developed during the Course<br>- Understanding of the statistic inference concepts, methods, and models. Development of the concept of the analysis of variance and of the classical econometric linear model. Acquiring the knowledge of what the nonlinear and discrete choice models are;<br>- Ability to apply these concepts and models to the predictive analysis;<br>- Ability to choose an appropriate computer programme and use it to solve the models mentioned above.<br><br>4.3. Course-specific skills<br>- Knowledge of the theoretical fundamentals and basic techniques of the statistical and econometric analysis;<br>- Acquirement of the subject-specific vocabulary;<br>- Development of the ability to analyze real business situations;<br>- Usage of appropriate techniques to compare the empirical validity of different economic and business theories, in their relation to, for example, consumption, savings, income, or consumer preferences;<br>- Skill to analyze new problems using the studied instruments and available statistical information, demonstrating logical and systematic reasoning, and extracting all the possible relevant information from the available data;<br>- Ability to establish a correlation between the subjects studied within this degree and use this knowledge in the field of mathematics, statistics, and economic theory;<br>- Encouragement for team work;<br>- Working with computer programmes as IBM SPSS Statistics and EViews;<br>- Identification of relevant sources of statistical and general information in the field of economics and business;<br>- Professional approach to analysis and usage of scientific methods in one's professional routine;<br>- Encouragement and development of critical thinking in general and of the critical approach to the election and use of the available resources to solve real-life problems in particular. |
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| **5. Contenidos de la Asignatura: temario / *Course Content: Topics*** |
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| TEMA 1 | INTRODUCTION TO MULTIVARIATE TECHNIQUES APPLIED TO BUSINESS AND ECONOMICS. |
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| 1.1 | Introduction to the methods of Multivariate Analysis: definition and classification. |
| 1.2 | Analysis of Variance (ANOVA). Single factor ANOVA. Factorial ANOVA. |
| 1.3 | Linear discriminant analysis. |
| 1.4 | Cluster analysis. |
| TEMA 2 | THE CLASSICAL LINEAR REGRESSION MODEL: SPECIFICATION AND ESTIMATION. |

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| 2.1 | Definition of econometric model. |
| 2.2 | The econometric model of linear regression: simple and multiple analyses. Matrix formulation of the model. Classical model assumptions. |
| 2.3 | Estimation method of Ordinary Least Squares (OLS). OLS estimators' properties. Interpretation of the regression coefficients. Marginal effect. |
| 2.4 | Goodness of fit. Coefficient of determination. Adjusted coefficient of determination. |
| 2.5 | Introduction into the model of dummy variables. |
| 2.6 | Linearization of functions: the log-log model. Elasticity and marginal effect. Models comparison. |
| 2.7 | Introduction to the use of EViews (I). |
| TEMA 3 | THE CLASSICAL LINEAR REGRESSION MODEL: INFERENCE AND PREDICTION. |
| 3.1 | Normality of random disturbance errors. Jarque-Bera test. |
| 3.2 | Confidence intervals. |
| 3.3 | Significance tests for individual explanatory variables, global significance tests for models, and general significance test of linear restrictions. Restricted model. |
| 3.4 | Chow test of a structural break. |
| 3.5 | Prediction. |
| 3.6 | Introduction to the use of EViews (II). |
| TEMA 4 | DETECTING AND SOLVING CLASSICAL LINEAR REGRESSION MODEL PROBLEMS. |
| 4.1 | Model specification errors. Detection tests. |
| 4.2 | Perfect and approximate multicollinearity: definition, detection and treatment. |
| 4.3 | Using EViews to deal with problems of specification in the model and multicollinearity. |
| 4.4 | Heteroskedasticity and autocorrelation. Properties of OLS estimates under non-spherical error terms. Generalized Least Squares (GLS) estimates. |
| 4.5 | Detection and treatment of heteroskedasticity with EViews. |
| 4.6 | Detection and treatment of autocorrelation with EViews. |
| TEMA 5 | DISCRETE DEPENDENT VARIABLE MODELS. |
| 5.1 | Introduction to binary choice models. |
| 5.2 | Linear probability model. |
| 5.3 | Logit and probit models. |
| 5.4 | Estimation of binary choice models using EViews. |

**6. Metodología y recursos /** *Methodology and Resources*

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| Metodología general<br>*Methodology* | Students are expected to attend lectures and practical sessions of the course, although teacher-student communication via the virtual platform WebCT is going to play an important role in the learning process, too.<br>Classroom-based teaching hours will be divided between General/Background Sessions (50%) and Practical/Developmental knowledge-building Sessions (50%). |
| Enseñanzas básicas (EB)<br>*General teaching* | During the term, there will one session of 1.5 hours a week. These classes will consist in general lectures; their objective is to introduce students into the basic theoretical principles of the subject. |

| Enseñanzas prácticas y de desarrollo (EPD) *Theory-into-practice* | As well, one weekly Practical/Developmental knowledge-building Session of 1.5 hours will be given during the semester. The object of these sessions is to offer a more detailed view to the theoretical material learned in the EB classes, use this knowledge to solve problems on the blackboard, as well as with the help of the specialized software IBM SPSS Statistics and EViews. To assure that the students are able to handle this software, some basic user guides for the programmes will be distributed among them in advance. Apart from these learning modules, there is a possibility for students to address any question or doubt related to the subject to the professor during individual tutorials. |
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| Actividades académicas dirigidas (AD) *Guided academic activities* | There are not |

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## 7. Criterios generales de evaluación / *Assessment*

| Primera convocatoria ordinaria (convocatoria de curso) *First session* | El 50% de la calificación procede de la evaluación continua. El 50% de la calificación procede del examen o prueba final. The students' learning progress follow-up will be assured by various control materials offered throughout the semester. The continuous assessment will make up 50% of the final mark of the course, that is, 5 points of 10. Various types of control have been designed to assess the skills acquired in different types of classes within this learning module: - The assimilation of the theoretical material will be checked by short tests in the end of each unit. The total value of this kind of control will be of 1.5 points. - As to the evaluation corresponding to the practical part of the course, the students will be periodically asked to do on their own and out of the classroom timetable some exercises related to different themes of the curriculum and hand them in to the lecturer. The total value of these exercises will be of 0.5 points. - As part of the learning process, the students will work with the programmes IBM SPSS Statistics (Unit 1) and EViews (Units 2, 3, 4, and 5). The evaluation of the corresponding skills will be carried out throughout the course by means of diverse practical exercises on the computer offered during certain sessions of which the students will be informed in advance. The total value of 1.5 points corresponds to this type of work with EViews. - Lastly, the students will be asked to realize an assignment in groups from to 3 to 5 members, in which they will demonstrate the theoretical knowledge acquired, as well as the practical skills and skills of handling the electronic tools of IBM SPSS Statistics and/or EViews. At the same time, they will show the level of group work competences which they will have achieved. This task will be given in advance, so as to allow sufficient time for students to realize it, and further task details will be published in the virtual platform. The total value of this work will be of 1.5 points, with 0.5 points of those corresponding to the evaluation of above mentioned computer programmes handling skills. The final exam will be organized in the end of the semester and will bear 50% of the final mark for the course, that is, 5 points out of 10. Within those 5 points the theoretical knowledge may have the value of 1.5 points, the evaluation material for this part will be |
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| | presented in the form of a test. As to the practical skills, those will have a joint value of 3.5 points; to pass this part students will be required to solve various problems.<br><br>In the case that a student fails to accumulate throughout the semester the minimal points required for the works which correspond to handling of computer programmes, they will have a possibility to improve this part of the continuous assessment tasks on the very day of the final exam realizing a specific additional task.<br><br>If the student complies with the minimum required, the final mark for the course will be calculated as a sum of those received for the written exam and as the result of continuous assessment. For the course to be passed, this sum shall amount to at least 5 points. |
| Segunda convocatoria ordinaria (convocatoria de recuperación)<br>*Second session (to re-sit the exam)* | Those who have not passed the course within the first call will be able to present themselves for the second call in June/July. The final exam will be retaken.<br><br>Students will be allowed to give up the points obtained throughout the course corresponding to the continuous assessment items (5 points), but then they will have to take an additional exam on the day of the exam. This exam will contain multiple choice questions, exercises, and activities intended to evaluate the computer programme handling skills. In order to take this additional exam, students will have to send an email at rbresan@upo.es 10 days before the exam date.<br><br>Those students who fail to reach the minimum passing score in the computer practices (1 point out of 2) will be required to take that exam again. |
| Convocatoria extraordinaria de noviembre<br>*Extraordinary November session* | Se activa a petición del alumno siempre y cuando éste esté matriculado en todas las asignaturas que le resten para finalizar sus estudios de grado, tal y como establece la Normativa de Progreso y Permanencia de la Universidad.<br>Se evaluará del total de los conocimientos y competencias que figuren en la guía docente del curso anterior, mediante el sistema de prueba única.<br>Same as second call. |
| Criterios de evaluación de las enseñanzas básicas (EB)<br>*General teaching assessment criteria* | Durante la evaluación continua: See previous sections.<br>Durante el examen o prueba final (1ª convocatoria): See previous sections.<br>Durante el examen o prueba final (2ª convocatoria): See previous sections. |
| Criterios de evaluación de las enseñanzas prácticas y de desarrollo (EPD)<br>*Theory-into-practice assessment criteria* | Durante la evaluación continua: See previous sections.<br>Durante el examen o prueba final (1ª convocatoria): See previous sections.<br>Durante el examen o prueba final (2ª convocatoria): See previous sections. |
| Criterios de evaluación de las actividades académicas dirigidas (AD)<br>*Criteria of assessment of guided academic activities* | Durante la evaluación continua:<br>Durante el examen o prueba final (1ª convocatoria):<br>Durante el examen o prueba final (2ª convocatoria): |
| Puntuaciones mínimas necesarias para aprobar la | 1ª convocatoria: - Final examination: 1.75 points of 5.<br>- Computer programme handling skills: 1 point of 2. |

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| Asignatura<br>*Minimum passing grade* | - Final examination + Continuous assessment: 5 points out of 10.<br>2ª convocatoria: - Final examination: 1.75 points of 5.<br>- Computer programme handling skills: 1 point of 2.<br>- Final examination + Continuous assessment: 5 points out of 10. |
| Material permitido<br>*Materials allowed* | Students must bring a non-programmable calculator and the official list of formulae and statistical tables without any additional notes. Students must attend the exam with an official identifying document (e.g. passport, DNI).<br>Students are not permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room. Students found with mobile phone/s on their person during any examination will have their examination immediately cancelled and removal from the examination room. |
| Identificación en los exámenes<br>*Identification during exams* | En cualquier momento de la realización de una prueba de evaluación los profesores podrán requerir la acreditación de la identidad de cualquier estudiante, mediante la exhibición de su carnet de estudiante, documento nacional de identidad, pasaporte u otro documento válido a juicio del examinador. Si no lo hiciese, el estudiante podrá continuar la prueba, que será calificada solo si la documentación es presentada en el plazo que el examinador establezca. |
| Observaciones adicionales<br>*Additional remarks* | None. |

Los estudiantes inmersos en un programa de movilidad o en un programa de deportistas de alto nivel, así como los afectados por razones laborales, de salud graves o por causas de fuerza mayor debidamente acreditadas, tendrán derecho a que en la convocatoria de curso se les evalúe mediante un sistema de evaluación de prueba única. Para ello, deberán comunicar la circunstancia al profesor responsable de la asignatura antes del fin del periodo docencia presencial.

*Students enrolled in a mobility program or a program for high-level athletes, as well as students affected by work or serious health problems or reasons of force majeure duly accredited, will have the right to be evaluated during the first session through a single test evaluation system. To do this, they must report changes in their circumstances to the program coordinator before the end of the teaching period.*

## 8. Bibliografía / *Bibliography*

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| Main references | • Gujarati, D.N. (2003) "Basic Econometrics", *McGraw-Hill*<br>• Gujarati, D.N. (2003) "Student Solutions Manual for Use with Basic Econometrics", *McGraw-Hill*<br>• Johnston, J. and Dinardo, J. (1997) "Econometric Methods", *McGraw-Hill*<br>• Studemund, A.H. (2001) "Using Econometrics. A Practical Guide", *Adison-Wesley-Longman* |
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