COURSE DATA

DATA SUBJECT

Code: 43774
Name: Survival models
Cycle: Master's Degree
ECTS Credits: 3
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2171 - Master's Degree in Actuarial and Financial Sciences	Facultat d'Economia	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2171 - Master's Degree in Actuarial and Financial Sciences	Quantitative methods	COMPULSORY

COORDINATION

MARTINEZ DE LEJARZA ESPARDUCER JUAN

SUMMARY

The course **Survival Models** is part of the Quantitative Methods subject area and is scheduled for the first semester of the first year. Its placement reflects the formative importance of the module within the curriculum, as it serves to establish the technical and methodological foundations that will support some of the subsequent developments students will encounter in other subjects.

In addition to its role as a foundation for later courses, this subject is also professionally valuable, as many of the concepts and skills acquired are directly applicable in professional practice. For example, students will develop skills in handling and estimating mortality tables and in calculating risk premiums associated with various life insurance products.

In the Survival Models course, the phenomenon of mortality is formally analyzed as a continuous function, and the different models used for its treatment are introduced. Students will learn how to estimate, from basic information sources, the probabilities needed to construct the mortality table, and will be introduced to the basic graduation and fitting techniques that make it possible to estimate the specific values of survival laws from the estimated probabilities.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

To successfully learn the content of this course, students should be familiar with the typical statistics topics taught in social science programs, as well as have basic skills in using standard computer tools. They will also need to understand the basic statistical aspects related to the use of mortality tables and the concepts of life actuarial statistics, which will have been introduced in the course Advanced Statistics for Actuaries (43773).

COMPETENCES / LEARNING OUTCOMES

2171 - Master's Degree in Actuarial and Financial Sciences

Alcanzar sólidos fundamentos en las técnicas matemáticas y estadísticas como base para la comprensión de otras materias y elaboración de modelos del riesgo utilizados en la práctica actuarial.

Comprender y ser capaces de desarrollar las técnicas matemáticas y estadísticas que resultan relevantes para el trabajo actuarial: modelos de supervivencia, siniestralidad, tarificación, previsión y solvencia.

Ser capaces de construir modelos adecuados al entorno económico empresarial a partir de las posibilidades que ofrecen las modernas tecnologías de la información y de la computación.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should demonstrate self-directed learning skills for continued academic growth.

DESCRIPTION OF CONTENTS

1. Main Mortality Models. Stochastic Modeling.

De Moivre's Law
Dormoy's and Sang's Laws
Gompertz's and Makeham's Laws
Other mortality models

2. Estimation of Crude Probabilities: General Population.

Demography and population
Demographic groups: concept and classification
Demographic analysis: longitudinal and cross-sectional analysis
Lexis diagram

3. Estimation of Crude Probabilities: Insured Population.

Population at risk. Calculation
The selection effect
Select tables

4. Graduation and Fitting. Introduction.

Interpolation and fitting
Parametric and non-parametric methods
Fitting with kernel weights
The sum method (King-Hardy)

5. Tables with Multiple Exit Causes: Disability.

Death and disability. Degrees of disability
Order and exposures. Dependent and independent probabilities
Practical model of disability
Rational model of disability

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	15,00
Classroom practices	15,00
Total hours	**30,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	2,00
Individual or group project	22,00

Independent study and work	21,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**45,00**

TEACHING METHODOLOGY

During the course, the program content will be covered by alternating theoretical and practical components. In general, theoretical classes will be delivered using the lecture method, in which the instructor will detail the fundamental aspects of each topic and guide the study through the relevant bibliography, which students should consult to complete and deepen their understanding of the subject.

Practical classes will involve considering applied questions and exercises that have been previously introduced in the theoretical classes. Students are expected to participate actively in these activities by discussing solutions and using appropriate computer techniques for their resolution.

In addition to these in-person activities, students will be required to engage in other activities aimed at autonomous learning, such as individual study, preparation for assessment activities, or the completion of individual or group assignments. For the successful completion of these activities, tutoring, whether individual or group, is a particularly important teaching resource, as it allows the instructor to monitor the group's progress and provides students with personalized guidance in their training program. Consequently, the use of this teaching resource is recommended and encouraged throughout the course.

EVALUATION

Assessment will be based on:

- A written exam that will include both theoretical questions and problems or exercises.
- Continuous assessment based on:

-Attendance and participation in classroom activities

-Periodic progress tests

-Activities carried out during the course: exercises, problems, case studies, and individual and/or group assignments

The written exam will account for between 60% and 70% of the final grade, and continuous assessment will account for between 30% and 40%.

In any case, a minimum grade of 5 out of 10 is required to pass the course, and a minimum of 5 out of 10 must also be obtained in the written exam.

To be assessed, activities and assignments must be submitted on the date and in the manner specified for each.

In the second exam session, the same assessment criteria as in the first session will be applied.

REFERENCES

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De Vylder, F. E. (1997). Life Insurance Theory: Actuarial Perspectives. Kluwer Academic Publishers.

Elandt-Johnson, R. C. Y Johnson, N. L. (1999). Survival Models and Data Analysis. Ed. Wiley. - Forfar, D.O.

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Livi-Bacci, M. (1993), Introducción a la demografía, Ed. Ariel Historia.

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Pavía, J.M. (2010), 101 Ejercicios resueltos de estadística actuarial vida. Garceta.

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