COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Finance and Statistics		
ACADEMIC UNIT	Department of Banking and Financial Management		
LEVEL OF STUDIES	**Undergraduate**		
COURSE CODE	ΧΡΗΜΠΕ	SEMESTER	5th or 7th
COURSE TITLE	Bayesian Econometrics with applications to Portfolio Choice		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
Lectures	4	7.5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek, with some material in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in Greek, with some material in English)
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is to introduce students to the Bayesian approach to inference and apply it in a Financial Economics context to tackle portfolio choice problems. Upon successful completion of the course, students should be able to:

- understand the differences between the classical (frequenist) and Bayesian approaches to inference.
- derive the posterior distributions and conduct statistical inference in analytically tractable models (e.g., models with conjugate priors).
- develop code for simulating from posterior distributions for more complex models (using, e.g., Gibbs sampling).
- use the Bayesian methodology to solve static portfolio choice problems with a single or multiple risky assets.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology *Adapting to new situations* *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Project planning and management* *Respect for difference and multiculturalism* *Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an interdisciplinary environment
Production of new research ideas

(3) SYLLABUS

The course offers an introduction to the Bayesian methodology employed in econometrics and statistics with increasing popularity in recent years. The Bayesian approach is applied in a Financial Economics context to tackle portfolio choice problems. We will cover the following topics.

1. Brief review of Probability Theory basics and Bayes' rule.
2. Discussion of the contrast between the classical (frequentist) and Bayesian approaches to statistical inference and how the prior distribution combines with the likelihood to generate the posterior distribution.
3. Bayesian inference for several standard statistical distributions, such as Binomial, Normal, Poisson, and Negative-Binomial.
4. Conjugate families of prior distributions.
5. Along the way, we will address the choice of prior, with emphasis on Jeffreys' prior, and discuss different modes of inference, that is, point estimation, interval estimation, and hypothesis testing.
6. Within the Gaussian framework, we will cover univariate linear regression models (with an application to beta estimation through shrinkage), univariate autoregressive models, multivariate linear regression models, and Vector AutoRegression models.
7. As we proceed, the course will also cover Monte Carlo simulation techniques that are used in posterior calculations, such as Acceptance-Rejection method and Gibbs sampling.
8. Applications of the Bayesian approach to portfolio choice problems. Within the Gaussian framework, we will cover the static portfolio choice problem with (a) a single risky asset and IID returns, (b) multiple risky assets and IID normal returns, (c) a single risky asset and predictable returns. Further, we will cover the Black-Litterman model from the Bayesian perspective.
9. Time permitting, we will discuss the dynamic portfolio choice problem with a single risky asset with Normal IID returns and unknown mean and variance.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face, with the possibility for part of the teaching to take place remotely (in case of emergency).
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Presentation slides in PDF format. • Distribution of slides through the E-class platform.

	• Use the department's computer lab for practical work in Matlab, or R or a similar programming language.

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	*Semester workload*
Lectures	52
Individual Study	60
Homework	75,5
Course total	187,5

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Assessment will be based on (a) homework assignments (50%) and (b) a final exam (50%). The homework will involve both theoretical and empirical work and will be assigned every 2 weeks on average during the semester. For the empirical part of the homework assignments students will be asked to analyze data and develop code in MatLab, R, or a similar programming language.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Geweke, J. (2005), Contemporary Bayesian Econometrics and Statistics, Wiley.
Greenberg, E. (2007), Introduction to Bayesian Econometrics, Cambridge University Press.
Bolstad, W.M. and J.M. Curran (2016), Introduction to Bayesian Statistics, Wiley.
Reich, B.J. and S.K. Ghosh (2019), Bayesian Statistical Methods, CRC Press.

- Related academic journals: