



Course Syllabus

Course Code	Course Title	ECTS Credits
MATH-329	Bayesian Statistics	6
Prerequisites	Department	Semester
MATH-225, MATH-280	Computer Science	Fall/ Spring
Type of Course	Field	Language of Instruction
Required	Mathematics	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Ioanna Pelagia	3 rd
Mode of Delivery	Work Placement	Corequisites
Face to face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Introduce the students to the foundations and principles of Bayesian methods.
- Provide the students with in-depth knowledge in prior and posterior distributions.
- Familiarize the students with the construction of estimators and test procedures based on Bayesian principles.
- Familiarize the students with hypothesis testing in the area of Bayesian inference.
- Familiarize the students with the construction of credibility intervals.
- Expose the students to Bayesian Inference in Linear Regression.
- Expose the students to computational Bayesian Statistics using Markov Chains.

Learning Outcomes:

After completion of the course students are expected to be able to:

- Calculate the prior and posterior distributions from sample distributions.
- Evaluate estimators and test procedure using specific criteria.
- Use hypothesis tests in Bayesian inference and make conclusions.

- Use criteria in the development of optimal estimators and test procedures.
- Use the R Language in computational Bayesian Statistics.

Course Content:

- Introduction to Bayesian inference.
- Prior and posterior distributions.
- Conjugate and non-informative priors.
- Bayesian estimators, accuracy and evaluation.
- Bayesian Inference for Discrete Random Variables and the Normal Mean.
- Comparison of Bayesian and Frequentist Inferences on the Mean.
- Loss functions, expected posterior loss and optimal decisions.
- Computational Bayesian Statistics using Markov Chains.
- Large sample Bayesian approximation.

Learning Activities and Teaching Methods:

Lectures, Handouts, Assignments and In-class Exercises.

Assessment Methods:

Final Examination, Midterm Examinations, Assignments and Participation

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Bayesian Statistics	James M. Curran, William M. Bolstad	Wiley	2016	978-1118091562

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Bayesian Data Analysis	Andrew Gelman	Chapman & Hall	2016	978-1439840955