COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Bayesian statistics	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Rimantas Eidukevičius **Other(s):**	Faculty of Mathematics and Informatics, Department of Econometric Analysis

Study cycle	Type of the course unit (module)
Second	Optional

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Classroom	Spring semester	English/Lithuanian

Requirements for students	
Prerequisites: Basic courses on statistics and probability theory	**Additional requirements (if any):**

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	125	42	83

Purpose of the course unit (module): programme competences to be developed		
The aim of the course: to understand properties of classical and Bayesian estimators, to evaluate adequacy of statistical models and to adjust them		
Learning outcomes of the course unit (module)	**Teaching and learning methods**	**Assessment methods**
will be able to use the Bayesian decision rules to explain the differences between ordinary and Bayesian statistical methods will be able to choose the prior distributions and to find posteriori distributions will be able to use the program WinBUGS	Lectures, group and individual tasks, group discussions, special literature study, the practical execution of tasks by using WinBUGS	Two intermediate examinations, the final written examination

Content: breakdown of the topics	Self-study work: time and assignments							
	Lectures	Seminars	Exercises	Laboratory work	Internship/work placement	**Contact hours**	**Self-study hours**	**Assignments**
1. Bayes risk, decision rules	4			2		**6**	**6**	[1], 1.1 – 1.3 section
2. Classification of observations	4			2		**6**	**6**	[1], 1.4 section
3.Estimators	2			1		**3**	**5**	[1], 1.5 section
4. Improper priors and maximum likelihood estimation	2			1		**3**	**5**	[1], 2.1, 2.2 sections

5. Conjugate priors	4			2		**6**	**10**	[1], 2.3 section
6. Non-informative Prior	4			2		**6**	**10**	[1], 2.6 section
7. Jeffreys' priors	2			1		**3**	**10**	[1], 2.7 section
8. Maximum entropy priors	2			1		**3**	**10**	[1], 2.8 section
9. Exponential families	2			1		**3**	**10**	[1], 2.12 section
10. Examples	2			1		**3**	**13**	[1], 2 section, [2]
Total	**28**			**14**		**42**	**83**	

Assessment strategy	**Weight,%**	**Deadline**	**Assessment criteria**
The first written intermediate exam	20	October	The exam consists of 2-4 practical tasks of equal value from 1-4 topics. The total value of them 2 points. If the task is not completed, the assessment shall be reduced proportionately.
The second intermediate exam using WinBUGS	20	November	The exam consists of 1-3 practical tasks of equal. The total value of them 2 points. If the task is not completed, the assessment shall be reduced proportionately.
The final written exam	60	During exam session	The exam consists of 4-6 theoretical (all topics) and practical (from 5-10 themes) tasks of equal value. The total value 6 points. If the task is not completed, the assessment shall be reduced proportionately. The ultimate assesment is the amount of points earned during the three tests, rounded to an integer

Author	**Year of publication**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing place and house or web link**
Compulsary reading				
1. M. A. T. Figueiredo		Lecture Notes on Bayesian Estimation and Classification		https://fenix.ist.utl.pt/disciplinas/aesta/2012-2013/2-semestre/lecture-notes
2. G. G. Woodworth		Introduction to WinBUGS		www.stat.uiowa.edu/~gwoodwor/BBIText/AppendixBWinbugs.pdf
Optional reading				
T. Lancaster	2005	An introduction to modern Bayesian econometrics		Oxford, Blackwell
J.-M. Marin, C.P. Robert	2013	Bayesian Essentials with R.		Springer-Verlag, New York.
I. Ntzoufras	2009	Bayesian Modeling Using WinBUGS		Wiley