Annex no. 3

to the Ordinance of the Rector of the Jagiellonian University of June 18, 2012

Class syllabus at PhD study programmes

|  |  |
| --- | --- |
| Class name | Introduction to Bayesian data analysis |
| Name of the unit offering the class | **Instytute of Psychology** |
| The language of instruction | English |
| Learning outcomes for the class: knowledge, skills and social competences | In this course, students will learn the basics of Bayesian inference. Both the R programming environment and the Stan modeling language will be used extensively. The end-goal is that students will learn how to formulate (some) research questions in the form of a Bayesian model or a contrast defined over the parameters of some Bayesian model, and will learn how to obtain answers in the form of a posterior distribution over the quantities of interest.  Knowledge:  - frequentist vs Bayesian inference  - exponential family distributions as versatile building blocks  - priors – their uses and their limitations  - attaching a (possibly hierarchical) linear regression structure using link functions  - hierarchical (mixed, multilevel) models  - robust inference  - basic sensitivity analysis  - basic meta-analysis  - [optional] combining Bayesian inference with causal inference  Skills:  Ability to perform basic Bayesian analyzes  Social competences:  Ability to collaborate when performing statistical analyzes |
| Class type: (obligatory/optional) | Optional |
| Semester/year | **II** |
| Name and surname of the teacher(s) | Borysław Paulewicz |
| Name and surname of the examiner(s) if the teacher is not the examiner | Borysław Paulewicz |
| Mode | Seminar, workshop |
| Preliminary and additional requirements | Basic statistical analysis |
| ECTS points awarded for the class | 3 |
| ECTS balance | *Contact hours – 30*  *Homeworks - 30 hours*  *Preparation of a final assignment – 30 hours* |
| Teaching methods | Workshop |
| Testing and assessment methods used to check the achievement of the learning outcomes | Practical exam at the computer. |
| The form and conditions for passing the class, including the thresholds for taking the exam/final test | 60% of correct answers. |
| The topics covered in class\* | - frequentist vs Bayesian inference  - exponential family distributions as versatile model-building blocks  - priors – their uses and their limitations  - attaching a (possibly hierarchical) linear regression structure using link functions  - hierarchical (mixed, multilevel) models  - robust inference  - basic sensitivity analysis  - basic meta-analysis  - [optional] combining Bayesian inference with causal inference |
| List of obligatory and additional reading \* | Statistical Rethinking wyd. 2. Richard McElreath  \*Bayesian Data Analysis wyd. 3 Gelman et. al.  \*Data Analysis Using Regression and Multilevel/Hierarchical Models Gelman & Hill  \*Bayesian Cognitive Modeling Lee & Wagenmakers  \*Doing Bayesian Data Analysis, Kruschke  [\* is recommended, nonobligatory reading] |

\* In particularly justified cases general information will be sufficient.