Study programme: MAS Geography

Level: Master

Course title: Modelling of the geographic phenomena

Teacher(s): dr Milivoj B. Gavrilov

Status: compulsory/elective: Elective

ECTS: 5

Requirements: None

Learning objectives: The study of basic concepts and methods of numerical modelling of the geographic phenomena. Linking the previous knowledge of geographic phenomena with the possibilities of their numerical modelling. To apply the modelling approach in simulation, reconstruction and prediction of the geographic phenomena.

Learning outcomes:

Minimum:

Students should learn the basic concepts and methods of numerical modelling of a geographic phenomenon. Students should gain a basic insight into the possibilities of reconstruction and predictability of the geographic phenomena.

Desired:

In addition to the stated above, students must demonstrate sufficient capacity to understand geographic phenomena to be able to independently model phenomena numerically. Students should apply the results obtained in different geographic and related disciplines.

Syllabus

Theoretical part:

Mathematical introduction: continuous and discrete variables and functions, and conversion operations.
Introduction to IT: Input data, output data, display data, discrete variables, arrays and matrices, and mathematical operations with discrete variables.
The geographic/physical model, mathematical model and numerical model of the same geographic phenomenon.
Division of models: deterministic and stochastic models, exact and parametric models.
Design, creation and testing of geographic models.

Practical part:

Application of models for simulation, reconstruction and prediction of geographic phenomena.

Literature:

1. Gavrilov, M. B., I. A. Tošić and M. Rančić, 2014: Numerical Method in Meteorology: Solved Problems, *LAP LAMBERT Academic Publishing*, Saarbrücken, Germany, 158 pp.
2. Marković S. B., A. Ruman, M. B. Gavrilov**,** T. Stevens, M. Zorn, B. Komac and D. Perko, 2014: Modeling of the Aral and Caspian Seas drying out influence to climate and environmental changes, *Acta Geographica Slovenica*, 54-1, 143–161, DOI: 10.3986/AGS54304.
3. Berger A., 1978: Long-Term Variations of Daily Insolation and Quaternary Climatic Changes, *Journal of the Atmospheric Sciences*, 35, 2362-2367.
4. Reginald William Thomas, Richard J. Huggett, *Modelling in Geography: A Mathematical Approach,* Science,1980.
5. Milanković M. M., 1941: Kanon der Erdbestrahlung und seine Anwendung auf des Eizeitenproblem. R. Serbian Acad. Spec. Publ. 132, Sect. Math. Nat. Sci., 33. Beograd: Königlich Serbische Akademie. Reprinted in English: Canon of Insolation and the Ice-Age Problem. Zavod za udžbenike i nastavna sredstva, Beograd (1998), 634 p.

Weekly teaching load 4 (60)	**Lectures 2**	**Exercises 2**

Methods of Teaching: Lectures, Illustration and Demonstration, Practical skills

Grading method (maximu 100 points)

Pre-examination assignements	points	**Final examination**	points
Activities during lectures	**0-5**	Written examination	
Practical skills	**0-5**	Oral examination	**30-45**
Colloquia	**20-40**	.....	
Seminar paper	**0-5**		