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| Course: | **GEOGRAPHIC INFORMATION SYSTEMS APPLICATIONS IN WATER MANAGEMENT** |
| Course id: 7МУВ9И09 |
| Number of ECTS: 6 |
| Teacher: | Atila A. Salvai, Pavel P. Benka |
| Course status | Elective |
| Number of active teaching classes (weekly) |
| Lectures: 30 | Practical classes: 30 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | None |
| 1. Educational goal

 The purpose of this course is to give an introduction to GIS and basic understanding of tools in the emerging field of water management for the practicing engineer. |
| 1. Educational outcomes

 Upon completion of the course, the student will:1. understand how geographical information systems work;
2. be able to explain the difference between raster and vector format;
3. describe the basics of how geographical databases work and are built up;
4. be able to evaluate quality and usability of different data sources for different GIS applications and analyses;
5. have acquired understanding of systems analysis approach to modeling of agricultural water systems;
6. have acquired basic knowledge of a number of decision making methods and tools;
7. be able to make appropriate and critical use of these methods and tools for a variety of water related problems;
8. be able to identify suitable methods and tools for solving allocation problems;
9. be able to critically assess research results;
10. improve skills for independent learning, reporting and presentation.
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| 1. Course content

 Geographic Information Systems and visualization techniques, geographical data and databases, analyses in raster and vector environment in GIS, reference systems and map projections, creation of maps ready for printing or digital publishing. Intelligent optimisation strategies - modern heuristic methods (e.g., evolutionary computing, simulated annealing, shuffled complex algorithm, etc); Data mining methods (e.g., predictive data mining, knowledge discovery, rule-based methods, artificial neural networks, genetic programming, fuzzy sets); Decision Support Systems, DSS (e.g., history, principles, frameworks, software tools, water management DSS); Complexity (cellular automata and grid-based methods); Modelling and models (typology, scale, forward and inverse modelling, calibration, validation and verification); Application examples in agricultural water management: Calibration and validation. |
| 1. Teaching methods

Practice, Consultations. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam (izabrati) | Mandatory | Points |
| Lecture attendance | No |  | *Oral part of the exam* | Yes | 40 |
| Exercise attendance | No |  |  |
|  Term paper | Yes | 60 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Longley P, Goodchild M, Maguire D. Rhind D. | Geographic Information Systems and Science | John Wiley & Sons, LTD | 2002 |
|  | T. Sutton, O. Dassau, M. Sutton | A Gentle Introduction to GIS | Spatial Information Management Unit, Office of the Premier, Eastern Cape,South Africa. | 2009 |
|  |  | QGIS Documentation | http://www.qgis.org/en/docs/index.html |  |
|  | Bolstad P. | GIS Fundamentals | Atlas Books, Inc. | 2005 |

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| Znak univerziteta | UNIVERSITY OF NOVI SADFACULTY OF AGRICULTURE 21000 NOVI SAD, TRG DOSITEJA OBRADOVIĆA 8 | Znak fakulteta2 |
| Study Programme AccreditationMASTER ACADEMIC STUDIES WATER MANAGEMENT |
| Table 5.2 Course specification |