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| Course: | **ADVANCED WATER RESOURCES SYSTEMS ANALYSIS** |
| Course id: |
| Number of ECTS: 6 |
| Teacher: | Bojan Srdjevic, Zorica Srdjevic, Dragan Savic  |
| Course status | Mandatory |
| Number of active teaching classes (weekly) |
| Lectures: 3 | Practical classes: 3 | Other teaching types: | Study research work: | Other classes: |
| Precondition courses | Basics in mathematics; also recommended previous knowledge in linear programming and network flows; use of Matlab, and Visual Basic would be advantageous; IT skills. |
| 1. Educational goal

This subject aims to provide an introduction to modern approaches, methodologies and computer oriented tools of advanced systems analysis. It also highlights the use of such techniques in the solution of problems related to water uses in lowland agriculture.  |
| 1. Educational outcomes

On successful completion of this subject, the students should: a) have acquired understanding of systems analysis approach to modeling of agricultural water systems; b) develop skills to understand and use modern approaches and methods of systems analysis in water resources planning, development and management on different spatial and temporal scales.c) improve IT skills. |
| 1. Course content

1. Introduction to water resources systems analysis; Systems definitions; General problem solving (understanding, planning, applying, revising); Systems Analysis and Thinking (Problem identification, boundaries, components, interactions and flows). 2. Water resources parameters analysis**:** -Supplies (Rainfall, Runoff, Groundwater), -Demands (in Agriculture), -Spatial and Temporal Distributions, -Legal Requirements, -Environmental Requirements, -Political Situation. 3. Catchment modeling and conveyance systems simulation; Simulation and optimization methods (deterministic and probabilistic); System performance indicators: risk (reliability), resiliency, and vulnerability. 4. Conflict Resolution; Multi Criteria Decision Analysis (MCDA); Modern heuristics and search engines (algorithms)5. Applications of systems analysis; Simulation and optimization techniques. |
| 1. Teaching methods

Lectures and exercises. Students will accomplish a semester project and present results in oral and in writing. The work counts for 60% of the final grade. The lectures are held in English. Retake exams may be oral only. |
| Knowledge evaluation (maximum 100 points) |
| Pre-examination obligations | Mandatory | Points | Final exam | Mandatory | Points |
| Assignments | Yes | 60 | Written and Oral | Yes | 40 |
| Literature  |
| Ord. | Author | Title | Publisher | Year |
|  | Srđević B. | Water Resources System Analysis Lecture notes, p. 36, | Faculty of Agriculture, Novi Sad | 2007 |
|  | Loucks D.P., van Beek E. | Water Resources Systems Planning and Management: An Introduction to Methods, Models & Applications. | UNESCO Publ. | 2005 |
|  | Chapra S. | Numerical Methods for Engineers, 5/e | McGraw-Hill. | 2006 |
|  | Michalewicz Z. | Genetic Algorithms + Data Structures = Evolution Programmes, | Springer-Verlag, ISBN: 000-354-055-387-8. | 1996 |
|  | Srdjevic B. | Systems Analysis Methods in Engineering With Extensions in Environmental Engineering, | Federal University of Bahia, Salvador, Brazil. Lecturing Notes. | 2003 |
|  |  | Internet sources (articles, reports, presentations) |  |  |

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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 - AGRICULTURAL WATER MANAGEMENT (LOLAqua) |
| Table 5.2 Course specification |