

Study program: Geoinformation Technologies

Qualification: PhD

| General Information | |
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| University | Yerevan State University (YSU) |
| Course title | Spatial Decision Support Systems |
| Course/Module code | Geoinformation Technologies |
| Course type | Elective |
| Year of Study | 1 st year, 1 st Semester |
| Term/Semester | Autumn (Semester) |
| Credits awarded | 5(ECTS), 150 Hours, |
| Degree | PhD/Master's |
| Enrollment status | Full-Time |
| Prerequisites and co-requisites (if applicable): | <ul style="list-style-type: none">- Data analytics- Knowledge of GIS and and geovisualization- Basic knowledge of spatial analysis- Competence in algebra |

| Lecturer's details | |
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| Name, surname | Dr. Artak Piloyan |
| Academic title | Assistant professor |
| Contact details | Email: artakpiloyan@ysu.am ; artakpiloyan@yahoo.com |
| Office hours and consultation schedule | 11:00-14:00 Monday, Wednesday |

| Course Structure | |
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| Type (compulsory/ optional): | Elective |
| Course Goal | The objective of this course is to introduce students to the fundamental concepts of Spatial Decision Support Systems (SDSS) and methods of Multi-Criteria Analysis applicable to solving spatial decision problems including site selection, resource allocation, and trade-off analysis of location decision alternatives such as, for example, business location selection, real estate choice, or evaluation of landfill site candidates. |

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| <p>Learning Outcomes</p> | <p>On completion of this course, participants should be able to:</p> <ul style="list-style-type: none"> - explain the principles of decision-making processes and decision support systems - distinguish between various phases of the decision-making process and their required types of information - discuss the linkages between GIS and decision support systems - apply spatial multicriteria decision analysis techniques to combine various layers of information; of different quality, format and type to support the planning and decision-making process - classify and compare different multicriteria evaluation techniques - use spatial multicriteria evaluation techniques in proposing an appropriate solution to a spatial problem - assess and interpret the results of the multicriteria evaluation process. |
| <p>Course contents:</p> | <ul style="list-style-type: none"> - Introduction to Spatial Decision-Making Methods - Introduction to Multiple Criteria Decision Analysis - Evaluation Criteria - Decision Alternatives and Constraints - Criterion Weighting Technique - Decision Rules/Aggregation Function - Lab #1: Landfill Site Selection - Site selection with multiple criteria and Geographic Information Systems (GIS) - MCDM Technique with Implicit Preferences - Lab #2: Real Estate Evaluation |
| <p>Assessment methods and criteria</p> | <p>This course is evaluated as follows:</p> <p>60% Assignments</p> <p>15% Final Exam</p> <p>25% In-class Exercises and Quizzes</p> |
| <p>Recommended textbooks and links (in order of relevance):</p> | <p>Recommended Textbooks:</p> <ol style="list-style-type: none"> 1. "Geographic Information Analysis for Sustainable Development and Economic Planning: New Technologies" by Giuseppe Borruso |

2. "Spatial Decision Support Systems: Principles and Practices" by Yao-Yi Chiang, Robert R. Gil-Garcia, and Suzanne P. Weisberg
3. "GIS and Multicriteria Decision Analysis" by Jacek Malczewski
4. "Multi-Criteria Decision Analysis for Supporting the Selection of Engineering Materials in Product Design" by Ali Bagheri and Paul Cooper

Online Resources:

1. "Introduction to Spatial Decision Support Systems" by Dr. R. Quentin Grafton and Dr. A. Jon Kimerling:
<https://www.youtube.com/watch?v=ChLpV09u0mc>
2. "Introduction to Multiple Criteria Decision Analysis (MCDA)" by Dr. Daniel H. Burnham: <https://www.youtube.com/watch?v=miRWEDzuTy4>
3. "GIS and Decision Making" by Esri: <https://www.esri.com/en-us/what-is-gis/overview>
4. "Spatial Multi-Criteria Decision Analysis (MCDA) with ArcGIS" by Esri: <https://www.esri.com/training/catalog/57630432851d31e02a43bba8/spatial-multi-criteria-decision-analysis-mcda-with-arcgis/>
5. "Spatial Decision Support Systems" by University of Illinois at Urbana-Champaign: <https://www.geog.psu.edu/course/geog-497d-spatial-decision-support-systems>