PhD program: Cartography and GeoInformatics

General Information	
University	Osh Technological University named after M. Adyshev (OshTU)
Course title	**Earth Observation**
Course/Module code	**Earth Observation**
Course type	Elective
Year of Study	1st year
Term/Semester	Spring semester
Credits awarded	5 ECTS (150 academic hours)
Degree	PhD
Enrollment status	Full-Time
Entry requirements/ Competences	

Lecturer's details	
Name, surname	**Nurgul Kadyrkulova**
Academic title	
Contact details	
Office hours and consultation schedule	
Course Structure	
Course Aim and Objectives	1. To develop students' understanding on what geospatial data mining and knowledge discovery are. 2. To enable students learn the methods of spatial data mining including classification, clustering analysis, association rules analysis. 3. To enable students critically review data mining and knowledge discovery problems through case studies.
Short Description	**Earth Observation**
Module/Topic	**Earth Observation**
Teaching Method	– Regular lectures; – Laboratory and practical works – Project work – Discussions in class
Form of Assessment	– Labs and computing tasks (25%)

	– Class discussion/participation (10%) – Project report (40%) – Final exam (25%)
Knowledge and understanding	- describe the importance of spatial data for planning, decision making and sustainable development - describe the current status/problems for spatial data in terms as availability, accessability, applicability and usability, - describe the general concepts and the aims for Spatial Big Data Analytics and the importance of data exchange, in detail, explain and give an account of the main components of Spatial Big Data Analytics, - describe the factors that influence the development of Spatial Big Data Analytics and the nature of these factors, - at a general level describe the concepts clearinghouse networks and geoportals, - in detail explain the different generations of clearinghouse networks, the main components of these networks, interoperability of these systems, the available standards to achieve interoperability and the principles of service orchestration, - explain the cartographic aspects for geoportals - give an account of concepts and technologies for modelling and evaluation of Spatial Big Data Analytics - describe and discuss what is meant with a society that is spatially enabled.
Learning Outcomes	On completion of the course, the student shall be able to: - explain the purpose of spatial data mining, - describe a range of data mining methods and their use in analyzing, - Identify and select the appropriate methods for mining knowledge from geo-spatial data, - analyze geo-spatial data and construct models, - test models through validation and able to criticize their reliability.
Course content	Module 1. Low-resolution models for image interpretation • Dealing with mixed pixels • The linear mixture model: definition of end members, applications in land-use/land-cover mapping, multiple endmember spectral mixture analysis • Regression approaches: multiple linear regression, regression trees, neural network regression Module 2. Contextual approaches for image interpretation

	• Use of texture: first-order and second-order texture measures, semi-variograms • Use of external data: stratification, stacked vector approach, rule-based post-classification • Object-oriented approaches: image segmentation, object-oriented classification Module 3. Mapping land use from remotely sensed data • LU mapping based on spatial-spectral band frequencies • Inferring land use from land cover: kernel-based approaches, region-based approaches, sub-pixel approaches Module 4. Accuracy and uncertainty in image interpretation • Dealing with problems in ground truthing: expanding the diagonal of the confusion matrix, the fuzzy error matrix • Modelling image classification uncertainty: global, thematic and local modelling of classification uncertainty
Literature:	**Mandatory:** **Elective:**