

Course/module description (*Advanced Geoinformation Technologies*)

Course provider (institution): Razzakov Kyrgyz State Technical University (KSTU), Department of Geodesy and Geoinformatics

Course title: Advanced Geoinformation Technologies (БД.2.В.2)

Target group: PhD Students (620100 – Geodesy and Remote Sensing Direction. Geodesy and Geoinformation Technologies Program)

Type (compulsory/optional): Mandatory

Number of ECTS credits allocated (if applicable); estimated workload: 10 ECTS (300 academic hours)

Mode of delivery (face-to-face/ distance learning etc.); number of contact hours:
96 class hours (64 - lectures, 32 – labs) and 204 hours for the self study

Language of instruction: Kyrgyz/Russian/ English

Prerequisites and co-requisites (if applicable): Basics of Geoinformation Technologies, Introduction to GIS, Knowledge of English for reading literature

Course aims:

Formation of theoretical knowledge and practical skills in application of geoinformation technologies, in matters collection, analysis, correction and presentation of spatially distributed information.

Learning outcomes:

- Features of working with geodata, spatial data models in GIS, types, structure and functions of GIS
- stages of collection, planning, design, creation and updating of GIS; methods of geodata analysis in GIS; features of creation and application of raster and vector electronic maps
- quality of GIS data for correctness;
- be able to create geodatabases and use for various analyses;
- create projects for personal GIS;
- visualize GIS geodata in different formats;
- carry out spatial correlation analysis;
- creation of new vector and raster layers of different subjects;
- work with attribute databases
- creating an individual GIS project;
- visualization and publication of GIS-materials.

Course content:

1. Data model for GIS; Raster data model; Vector data model; Satellite Imagery and Aerial Photogrammetry;
2. Digitalization and image rectification using GIS and RS data; Working with features; Working with topology;
3. Data correction, map accuracy assessment; Thematic Accuracy; Positional Accuracy
4. Databases (SQL, meta data); Design the geodatabase schema; Creating a geodatabase;
5. Spatial analyst; Interpolations; Digital elevation models; Creation of slope maps; Reclassifications;
6. Implementation of GIS in different field; Enterprise GIS.

Recommended or required reading and other learning resources/tools:

1. Course teaching materials available through the university ELMS;
2. Instant messaging, blog and personal electronic communication platforms;

Required literature:

1. Advance GIS. Book. Claudia M. Bauzer Medeiros, Institute of Computing, University of Campinas, Campinas, Brazil.
2. GIS tutorial. Advance book. David W. Allen, Jeffery M Coffey, Esri.
3. Обработка цифровых аэрокосмических изображений для геоинформационных систем. Учебник / С.Г. Емельянов, ТНТ, 2012
4. Map Projections. Erik W. Grafarend, Friedrich W. Krumm. Springer-Verlag Berlin Heidelberg 2006, 713 p.

Additional literature:

1. Principles of GIS. Otto Huisman, Rolf A. De By, 2009, The Netherlands.
2. Геоинформатика. Книга 2. 2-е издание. Е.Г. Капралов, А.В. Кошкарев, В.С. Тикунов, В.В. Глазырин, С.С. Замай, И.К. Лурье, В.А. Охонин, В.И. Пырьев, В.И. Семин, Б.Б. Серапинас, О.Э. Якубайлик, А.В. Симонов, Изд. «Академия», Москва, 2008.
3. Руководство по пространственному анализу. Энди Митчел. ESRI 1997, 177 p.

Planned learning activities and teaching methods:

1. Regular lectures;
2. Labs and computing tasks;
3. Regular quizzes, and discussions on the questions from the quizzes;
4. Class discussions.

Assessment methods and criteria:

1. Individual project (25%)
2. Labs and computing tasks (25%)
3. Class discussion/participation (10%)
4. Final exam 40%

Grading system: Five-point academic grading system,
where 5 - "Excellent" and 2 - "Unsatisfactory" (A, B, C, F)

Additional information: Course instructor – Dr. Akylbek Chymyrov.
Contacts: chymyrov@kstu.kg, tel.: +996-552-622916