

**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.  
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