

Course/module description (*Integrated positioning and navigation - Интегрированное позиционирование и навигация*)

Course provider (institution): Razzakov Kyrgyz State Technical University (KSTU)

Course title: Reference Systems in Geodesy (БД.2.В.3)

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

Type (compulsory/optional): Compulsory

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): Geography/Geodesy/Engineering Geodesy/Information Technology, knowledge of English for reading literature and communication

Course aims:

The purpose of teaching the discipline is to provide PhD Doctoral students with a set of knowledge about global navigation technologies, methods and tools used in space, marine and land navigation to determine navigation parameters and coordinates of points on the physical surface of the Earth using global navigation satellite systems (GNSS) GLONASS, GPS, GALILEO and others. Students should know the principles and fundamentals of space geodesy and global navigation satellite systems. PhD Doctoral students acquire the ability to conduct satellite measurements using GNSS, the ability to control the workflow, determine the accuracy and quality of the results. Introducing students to geodetic computations on the sphere, ellipsoid and map projection planes, definition of geodetic reference systems and transformations among different systems.

Learning outcomes:

After taking this course, the students should (be able to do):

know:

- the basics of space geodesy, as well as its relationship to other Earth sciences;
- system and principles of functioning and application of basic GLONASS and GPS.

be able to:

- use global satellite navigation systems in solving research and applied problems.

to own:

- planning and carrying out desk and field works with the use of modern tools and methods of satellite positioning;
- organize and manage field and desk topographic-geodesic and aerospace works and conduct scientific and technical expertise of projects.

Course content:

1. General information on space geodesy.
2. Global navigation satellite system.
3. Global Positioning System (GPS).
4. Coordinate systems.
5. Sources of error and how to mitigate their effects.
6. Sources of errors and ways to mitigate their effects.
7. Field reconnaissance.

<p>8. Basic types of receivers and antennas.</p> <p>9. Use of satellite systems to solve geodynamic problems.</p> <p>10. Use of satellite systems to solve geodetic problems.</p> <p>11. An example of the use of GNSS technologies to ensure environmental and technological safety.</p>
<p>Recommended or required reading and other learning resources/tools:</p> <ul style="list-style-type: none"> - Course teaching materials available through the university ELMS; - Instant messaging, blog and personal electronic communication platforms; <p>Required literature:</p> <ol style="list-style-type: none"> 1. Генике А., Побединский Г.Г. Глобальные спутниковые системы определения местоположения и их применение в геодезии. Издание 2-е, Москва, Картогеоцентр, 2004. 2. Ключин Е.Б., Куприянов А.О., Шлапак В.В. Спутниковые методы измерений в геодезии. Учебное пособие. МИИГАиК, 2006. 3. Антонович К.М. Использование спутниковых радионавигационных Систем в геодезии. Москва, Картогеоцентр, 2006. <p>Additional literature:</p> <ol style="list-style-type: none"> 1. Поваляев А.А. Спутниковые радионавигационные системы: время, показания часов, формирование измерений и определение относительных координат. Радиотехника, Москва, 2008 г.
<p>Planned learning activities and teaching methods:</p> <ol style="list-style-type: none"> 1. Lectures and seminars; 2. Laboratory work and computing tasks; 3. Individual project work; 4. Class discussions.
<p>Assessment methods and criteria:</p> <ol style="list-style-type: none"> 1. Lab assignments and computing tasks (25%) 2. Participation in class activity (5) 3. Individual project (30%) 4. Final exam 40% <p>Grading system: Five-point academic grading system, where 5 - "Excellent" and 2 - "Unsatisfactory" (A, B, C, F)</p>
<p>Additional information: Course instructor – Dr. Akylbek Chymyrov. Contacts: chymyrov@kstu.kg, tel.: +996-552-622916</p>