SAFETY MONITORING OF TECHNOSPHERE OBJECTS

Basic information

Duration (ECTS)	360 hours (10 ECTS credits)
Starting date	October, 1
Language of instruction	English level B1 (European Framework for Reference of Communicative Skills)
Entry requirements	BSc or MSc degree in Environmental Sciences, Engineering, Chemistry or Physics

Course description

This course is devoted to hardware technologies of remote sensing and physical basis of sensing (technologies enabling to restore data received from satellites). Special emphasis is made on hydro meteorological monitoring, weather forecasting, control of emergencies, monitoring of global changes of the Earth and its climate, monitoring of global environmental pollution and thermal anomalies.

Special Features

The problems of remote sensing of the Earth are of high priority areas for scientific research and technological development in the Russian Federation. Remote sensing data play an important role in solving emergency monitoring tasks, monitoring of global changes of the Earth and its climate and global monitoring of environment pollution.

Course aim

The course aims to introduce remote sensing techniques of the Earth from space. This technical approach could help to solve current environmental challenges, problems of agro ecology and environmental management, and it can be used as a monitoring tool of technosphere objects.

Course objectives

This course is especially designed to provide students with knowledge of the general theory of remote sensing and with skills required for the implementation of sensing hardware used for technosphere objects monitoring, and the ability to apply data from foreign satellites and Russian platforms for civil use.

Learning outcomes

Upon completion of the course students will recognize and use surface reconstruction algorithms for the Earth and its underlying surface, they will demonstrate data reconstruction skills and implement a set of installations, which can be obtained after satellite data restoration. Moreover, students will be able to evaluate reflection coefficient and surface albedo.

Outline of the content

Week	Lectures	Seminars/Practice	Hours
1-3	Course history. Necessity of developing a system for monitoring of technosphere objects.	Experience in application of satellite data for monitoring challenges.	36
4, 5	Application of contemporary technologies for solving monitoring tasks of technosphere objects.	Experimental study of currently applied technologies.	54
6	Databases of remote sensing devices; Open access databases.	Application of databases containing remote sensing data.	72
7, 8	Passive and active methods of remote sensing.	Examination of trajectories and orbit of satellites with application of data from public databases.	36
9, 10	Characteristics of the Earth's atmosphere that influence radiation transmission.	Experimental study of the atmosphere characteristics for determining its transparency.	54
11, 12	Remote sensing technology. Transmission function of atmospheric constituents.	Numerical study of the spectral brightness coefficient.	
13, 14	Russian and international meteorological satellite constellation, its functions and responsibilities.	Numerical study of the data obtained by Russian meteorological satellite constellation.	54
15-18	Surface reconstruction algorithms for the Earth and its underlying surface, physical basis of data reconstruction.	Experimental study of the process of data reception and processing.	54

Course assessment

By the end of the course students should pass an exam.

Attendance policy

Organization of individual studies is performed in accordance with the schedule of the educational process. Recommended literature should be studied in order to handle the topics listed above. Assignments given after lectures are used for the monitoring of the educational process.

Contact information

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