Study program: Geoinformation Technologies

Qualification: PhD

General Information	
University	National University of Architecture and Construction of Armenia
Course title	**Advanced geodesy**
Course/Module code	Geoinformation Technologies
Course type	Mandatory
Year of Study	1st Year
Term/Semester	1st Semester
Credits awarded	2 (ECTS), 16 Hours
Degree	PhD
Enrollment status	Full-Time
Prerequisites and co-requisites (if applicable):	• General Geodesy knowledge • Basic knowledge of Geoinformation technologies. • Basic knowledge of engineering geodesy.

Lecturer's details	
Name, surname	Anush Margaryan
Academic title	Associate Professor
Contact details	Email: anush.margaryan.89@mail.ru
Office hours and consultation schedule	09:00-14:00 Monday, Wednesday, Friday

Course Structure	
Type (compulsory/ optional):	Compulsory

Course Goal	The aim of the course is to provide students with a deep understanding of geodetic principles, including advanced concepts in geodetic datum and coordinate systems. Besides, to teach students how to process and analyze geodetic data, including error analysis, adjustment techniques, and statistical methods.
Learning Outcomes	After completing this course, the students will be able: • To understand advanced geodetic principles, standards, Geo data etc. • To use and understand advanced surveying and measurement technique • To process and analyze geodetic data using advanced methods • To apply geodetic principles in conjunction with other scientific and engineering disciplines. • To understand real-world challenges related to land surveying, geophysical monitoring, etc.
Course contents	1. Fundamentals of Geodesy (introduction) 2. High-Precision Surveying 3. Advanced surveying instruments and equipment 4. GNSS (Global Navigation Satellite Systems) 5. Remote sensing applications in geodesy 6. Terrestrial laser scanning (LiDAR) and photogrammetry 7. Error theory and propagation in geodetic measurements 8. Advanced understanding of geodetic reference systems (WGS84 etc.) 9. Coordinate system conversions/ transformations 10. Geodetic aspects of civil engineering and construction 11. Environmental monitoring 12. Geodetic support for satellite-based positioning systems (e.g., GPS, Galileo) 13. Geodetic software packages (Trimble, Leica, ESRI)

	14. Data processing and analysis using software (Arcgis Pro, QGIS) 15. Geospatial analysis (Data collection, analysis, and interpretation) 16. The latest developments in geodesy (Open data, geoportal) 17. Integration of geodesy with geospatial information systems (GIS) 18. GIS programs and geodesy 19. Directions and challenges in Geodesy
Assessment methods and criteria	• Practical task • Project task • Final test exam For successfully accomplishment this course student must complete practical task. The project task should be developed and introduced individually before the final exam. Project tasks should cover coding skills and working with geospatial data. The final exam will check the theoretical part of the course.
Recommended textbooks and links (in order of relevance):	• "Geodesy" by Wolfgang Torge and Jürgen Müller, 2012 • "GPS Satellite Surveying" by Alfred Leick, Lev Rapoport, Dmitry Tatarnikov, 2015 • "Adjustment Computations: Spatial Data Analysis" by Charles D. Ghilani and Paul R. Wolf, 2006 • "Integration of geodetic techniques into a global Earth monitoring system and its implication for Earth system sciences" by Hans-Peter Plag, 2000 • https://www.esri.com/en-us/home • https://www.sentinel-hub.com/ • https://www.qgis.org/ru/site/

	• https://www.trimble.com/en • https://www.geoportal.org/