Study program: Geoinformation Technologies

Qualification: PhD

General Information	
University	National University of Architecture and Construction of Armenia (NUACA)
Course title	Reference systems
Course/Module code	Geoinformation Technologies
Course type	Mandatory
Year of Study	1st Year, 1st semester
Term/Semester	Autumn Semester
Credits awarded	5 (ECTS), 20 Hours
Degree	PhD
Enrollment status	Full-Time
Prerequisites and co-requisites (if applicable):	• General computer skills/Basic algorithm knowledge • Basic knowledge of database structure (Tables, keys, relationships), • Basic knowledge of Geoinformation technologies.

Lecturer's details	
Name, surname	Samvel Kroyan
Academic title	Associate Professor
Contact details	Email: kroyan.samvel@mail.ru
Office hours and consultation schedule	09:30-14:30 Monday, Wednesday, Friday

Course Structure	
Type (compulsory/ optional):	Compulsory

Course Goal	The aim of the course is to acquaint the student with modern geodetic reference systems, to provide information on reference ellipsoidal coordinate systems, the earth's gravity field, and reference stations.
Learning Outcomes	At the end of the course, the student will be able to: (knowledge and understanding) · explain the nature and significance of reference systems · explain decaying potential, · apply the inhomogeneity of the gravimetric field in engineering geodesy, (abilities) · carry out calculation of gravimetric, normal anomalous fields and include vertical deviations in geodetic problems, · calculate the geoid using the global gravimetric model, as well as the Stokes formula and the simple combined method, · apply calculations of relief and Bouguet's corrections.
Course contents	1. General understanding of existing reference systems. 2. Ellipsoidal coordinate systems. Reference and time systems. 3. Geoid, the earth's gravitational field. 4. ITRF 2008, WGS 84, EUREF 89 reference systems. 5. Recalculation of point coordinates. 6. Cartographic projections.
Assessment methods and criteria	The learner appears for the final certification, the exam of the exam period, which is conducted with completed independent work and questionnaires that fully represent the course. The exam is conducted by oral examination, during which the student's achievements are checked, and the student's answer is It is divided into 20 units.
Recommended textbooks and links	

(in order of relevance):	1. H. Fan (2012). Theoretical geodesy. KTH.
	2. Huaan Fan, Theory of Errors and Least Squares Adjustment" (KTH), Stockholm, Sweden, 1997, 226 p.
	3. Klyushin E.B., Kupryanov A.O., Shlapak V.V. Satellite methods of measurements in geodesy. (Chapter 3). - Moscow (MIIGAIK), 2006. - 60 p.
	4. Wellenhoff, et.al. (2005). GNSS – Theory and Practice. Springer Verlag. (optional reading), 160 p.
	5. Sneden R. Mapping Earth from Space, Raintree Freestyie Express, Bern 2010, 56 p.
	6. Gravimetry and geodesy. - Moscow, Scientific World, 2010. - 723p.
	7. H.S. Petrosyan Foundations of the state and national geodetic networks of Armenia. Yerevan, 2019. 196 pages.
	8. Genike A. A., Pobedinskiy G. G. Global satellite systems of location determination and their application in geodesy. M.: Kartgeocentr, 2004. 335p.
	9. Shanurov G.A. Higher Geodesy. Concepts and definitions - Moscow, 2015. 64 p.
	10. Kontaruk E.M. Satellite GLONASS/GPS receivers and prospects for their usein Russia // Newsletter of the GIS-Association. - 2000. - N!! 3(25). WITH. 53-55.
	11. Lipkin I.A. Satellite navigation systems. - M.: Vuzovsk. book, 2001. 288 With.
	12. https://en.wikipedia.org/wiki/Spatial_reference_system
	13. https://www.geoweeknews.com/blogs/vol13no45-reference-systems-and-reference-frames
	14. https://docs.qgis.org/3.28/en/docs/gentle_gis_introduction/coordinate_reference_systems.html
	15. https://gisgeography.com/wgs84-world-geodetic-system/ . . . .
	16. https://www.swisstopo.admin.ch/en/knowledge-facts/surveying-geodesy/reference-systems.html
	17. http://chapman.upc.es/lectures/legad/node17.html

	18. https://gisgeography.com/wgs84-world-geodetic-system/.