PhD program: Cartography and GeoInformatics

General Information	
University	Osh Technological University named after M. Adyshev (OshTU)
Course title	Positioning and Navigation
Course/Module code	Positioning and Navigation
Course type	Elective
Year of Study	1st year
Term/Semester	Spring semester
Credits awarded	5 ECTS (150 academic hours)
Degree	PhD
Enrollment status	Full-Time
Entry requirements/ Competences	

Lecturer's details	
Name, surname	Zholchubek Kutunaev
Academic title	
Contact details	zh.kutunaev@mail.ru
Office hours and consultation schedule	
Course Structure	
Course Aim and Objectives	At the end of the course, successful students will have an understanding of the basic workings of - GPS. Be able to use various GPS units (Garmin, Trimble), and be familiar with the Trimble - Pathfinder Office GPS processing software. The student will also be able to use ArcCollector in conjunction with ArcGIS Online databases.
Short Description	Positioning and Navigation
Module/Topic	Positioning and Navigation
Teaching Method	– Regular lectures; – Laboratory and practical works – Project work – Discussions in class
Form of Assessment	– Labs and computing tasks (25%) – Class discussion/participation (10%)

	– Project report (40%) – Final exam (25%)
Knowledge and understanding	Electronic navigation - GPS terms - GPS use - Using waypoints - ArcGIS - ArcGIS Online
Learning Outcomes	On completion of the course, the student shall be able to: Electronic navigation - GPS terms - GPS use - Using waypoints - ArcGIS - ArcGIS Online
Course content	Lesson 1: Introduction to Positioning and Navigation Lesson 2: Fundamentals of Navigation Lesson 3: Satellite-Based Navigation Systems Lesson 4: Inertial Navigation Systems (INS) Lesson 5: Sensor Fusion Lesson 6: Advanced Navigation Techniques Lesson 7: Navigation Challenges and Solutions Lesson 8: Review and Future Directions PRACTICES: Lab #1. Introduction to Positioning and Navigation Lab #2. Fundamentals of Navigation Lab #3. Satellite-Based Navigation Systems Lab #4. Inertial Navigation Systems (INS) Lab #5. Sensor Fusion Lab #6. Navigation Challenges and Solutions Lab #7. Navigation Challenges and Solutions Lab #8. Review and Future Directions
Literature:	**Mandatory:** 1. Hofmann-Wellenhof, B., H. Lichtenegger, and J. Collins. *GPS*

	Theory and Practice. Springer, 1994. ISBN: 9780387824772. 2. Parkinson, B. W., J. Spilker, et al. *Global Positioning System: Theory and Applications*. Vol. 1. American Institute of Aeronautics & Ast, 1996. ISBN: 9781563471063. 3. *Global Positioning System: Theory and Applications*. Vol. 2. American Institute of Aeronautics & Ast, 1996. ISBN: 9781563471070.