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| 1 | **Course title** | **Introduction to Geographic Information Systems (GIS)** |
| 2 | **Course title in English** | **Introduction to Geographic Information Systems (GIS)** |
| 3 | **Term/Semester** | 1 Semester |
| 4 | **Credits awarded** | 6 ECTS |
| 5 | **Course Outline/Calendar** | **Full: 32 Hour**Lectures - 15 h. Seminars - 12 სთ.Midterm Assessment - 2 სთ.Project Presentation- 1 სთ. Final Test- 2 სთ. |
| 6 | **Lecturer** | **Name, surname:**  Irakli Ugulava**Academic title:** Professor, Doctor**Academic Rank:** Assistant professor**Contact details :** 599 172016**E-mail:**  i.ugulava@gmail.com |
| 7 | **Prerequisites for learning course** | **No Prerequisites** |
| 8 | **Learning methods** | * Lecture
* Verbal Method
* Demonstration
* Presentation
* Problem-based learning
* Seminar
* Accident analysis
* Deduction & Induction
* Group working
* Debates and Discussions
 |
| 9 | **Course aim** | The aim of the course is to develop students’ understanding of the GIS Technologies, to enhance their skills in taking decisions on GIS Data Management and Understanding of use of case study to analyze the impact or influence of technology on decision making. |
| 10 | **Objectives** | * Plan and execute a successful GIS project using multiple data sources
* Collect and input spatial data using a variety of different methods
* Understand digitizing and scanning as tools for data acquisition
* Geo-reference aerial photographs to their true coordinates
* Query and manipulate GIS data using database techniques
* Identify and solve common problems found in a GIS project
* Exchange data between different GIS systems
* Making Maps
 |
| 11 | **Field-Related and General Competencies:** | ***Upon completion of the course students are aware of:*** How to compile, analyze, and present geospatial data while emphasizing the value of visual communication. Students will learn these basic geospatial concepts while primarily working with ESRI’s ArcGIS softwareand exploring other GIS products.***Upon completion of the course students have developed ability to:**** Gain analyze and make use of theoretic or statistical information in the field of GIS.
* Critically evaluate, analyze and consequently make logical and consistent conclusions about the topics and questions related to the course;
* Make effective communication using proper field-related terminology;
* Make efficient use of modern information technologies;
* Evaluate the learning process;
* Keep and consider the field-related ethical norms.
* Work in a team, in the different roles, know how to accept and assign tasks, has the elementary organizational skills.
* Think and act entrepreneurial.
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| 12 | **Evaluation and grading** | **Assessment is within 100 points.**Grade breakdown is as follows: (A) 91–100 Excellent (B) 81–90 Very Good(C) 71–80 Good (D) 61–70 Satisfactory(E) 51–60 Enough (FX) 41–50 Fail, but a student has the right to re-sit the exam only once (F) 0-40 Low failure, a student should repeat the course to get the credit.

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| **Form** | **Assessment Components:** | **min. Point** |
| **Midterm Assessment/test** | * Quiz I, II - 20 **Point**
* Midterm Assessment/test I, II – 30 **Point**
* Project Presentation - 20 **Point**
 | 21  |
| **Final Point** | * Final Test - 30 **Point**
 | 10  |
| **Sum:** | **100**  |  |

1. **attendance at the final examination is necessary for all students!**
2. **Quiz I, II – 20 Point**

During the semester, students will be evaluated by quizzes, which include the material and evaluated max. 10 points.Each quiz consists of:* 5 closed question - 5 points (one answer 1 point)
* 5 open question - 5 points (one answer 1 point)

**Rate**:

|  |  |
| --- | --- |
| Correct answer | Incorrect Answer |
| 1 | 0 |

**Open question rate:**

|  |  |  |
| --- | --- | --- |
| Correct and fully substantiated answer | Correct, though partially grounded / unsubstantiated response | Wrong answer / reply is not representative |
| 1 | 0.5 | 0 |

**Midterm Assessment I, II - 30 points (each 15 points)**Midterm Assessment implies writing tasks that include 5 open questions and 1 case.Midterm Assessment covers the material before the assessment and is rated at a maximum of 15 points. Writing consists of:* + **5 Open answer - 10 point**
	+ **1 Case analysis- 5 point**

**Test Rank:**

|  |  |
| --- | --- |
| Correct Answer | Incorrect Answer |
| 1 | 0 |

**Open Question Rank:**

|  |  |  |
| --- | --- | --- |
| Correct and fully substantiated answer | Correct, though partially grounded / unsubstantiated response | Wrong answer / reply is not representative |
| 2 | 1 | 0 |

**Case analysis Rank:**

|  |  |  |
| --- | --- | --- |
| **Evaluation criteria:** | **Points** | **Max. Score** |
| Identify the problem correctly and fully |  | **2** |
| Problem solving guide |  | **2** |
| Argumented and consistent discussion |  | **1** |

**Rank:**

|  |  |  |
| --- | --- | --- |
| Excellent | Fair | Poor |
| 2 | 1 | 0 |

|  |  |
| --- | --- |
| Good | Bad |
| 1 | 0 |

1. **Project Presentation- 20 Point**

 Students have to make a presentation about any of the essential issues of the following topics. The assessment will be based on two components:1. **Written work- 10 Points**
2. **Presentation – 10 Points**

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| --- | --- | --- |
| **Evaluation criteria:** | **Points** | **Max. Score** |
| Find, process and analyze information |  | **4** |
| Argumented and consistent discussion |  | **3** |
| The quality of the material used |  | **2** |
| To preserve academic style norms |  | **1** |

|  |  |  |
| --- | --- | --- |
| **Evaluation criteria for group presentations:** | **Points** | **Max. Score** |
| Content deliberation, consistency and completeness of the presentation |  | **2** |
| Visual and technical side of the presentation |  | **2** |
| **Evaluation criteria for each group member presentations:** | **Points** | **Max. Score** |
| correct and exhaustive responses to audience questions |  | **4** |
| Presentation, effective time management |  | **2**  |

**Rank:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Excellent | Very Good | Good | Fair | Poor |
| 4 | 3 | 2 | 1 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| Excellent | Good | Fair | Poor |
| 3 | 2 | 1 | 0 |

|  |  |  |
| --- | --- | --- |
| Good | Fair | Poor |
| 2 | 1 | 0 |

|  |  |
| --- | --- |
| Good | Poor |
| 1 | 0 |

1. **Final Test - 30 Points**

The final exam is written and includes the complete material before the assessment. Writing consists of:* 10 Closed question - 5 Point (Each Answer 1 Point)
* 10 Open question - 20 Point (Each Answer 2 Point)
* 1 Case Analysis - 5 Point

**Test Ranking:**

|  |  |
| --- | --- |
| Correct Answer | Incorrect Answer |
| 1 | 0 |

**Open Answer Ranking:**

|  |  |  |
| --- | --- | --- |
| Correct and fully substantiated answer | Correct, though partially grounded / unsubstantiated response | Wrong answer / reply is not representative |
| 2 | 1 | 0 |

**Case Analysis Rank:**

|  |  |  |
| --- | --- | --- |
| **Evaluation criteria:** | **Points** | **Max. Score** |
| Identify the problem correctly and fully |  | **2** |
| Problem solving guide |  | **2** |
| Argumented and consistent discussion |  | **1** |

**Rank:**

|  |  |  |
| --- | --- | --- |
| Excellent | Fair | Poor |
| 2 | 1 | 0 |

|  |  |
| --- | --- |
| Good | Poor |
| 1 | 0 |

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| 13 | **Literature** | **Basic Literature:*** ინფორმაციული ტექნოლოგიები გეოგრაფიაში, ვ. ჩხაიძე, ი. სალუქვაძე. თბილისი 2016
* *Making Spatial Decisions Using GIS:* ISBN: 9781589482807    2011   172 pages.
* *მანუალი:* როგორ შევქმნათ რუკა Qgis-ის გამოყენებით.
* Modeling Our World The Esri Guide to Geodatabase Concepts, Second Edition by Michael Zeiler.
* Understanding GIS An ArcGIS Project Workbook.
* Getting to Know ArcGIS Desktop, Updated for ArcGIS 10.
* Thinking About GIS.
* Geographic Information System Planning for Managers.
* Esri Press
* Quantum GIS Training Manual: A Comprehensive Introduction to Quantum GIS
* QGIS Map Design by Anita Graser & Gretchen N. Peterson
* Getting Started with GIS Using QGIS
* The Quantum GIS Training Manual

**Additional sources:*** [www.mygeorgia.ge](http://www.mygeorgia.ge)
* <http://propertymap.tbilisi.gov.ge/>
* [www.esri.com](http://www.esri.com)
* [www.gis.com](http://www.gis.com)
* [www.dataplus.ru](http://www.dataplus.ru)
* www. stackoverflow.com
* [www.qgistutorials.com](http://www.qgistutorials.com)
* [www.gislounge.com](http://www.gislounge.com)
* [www.qgis.org](http://www.qgis.org)
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| 14 | **Topics By Weeks** |  |
|  |  **Week**  | Learning Form | Subject / Activity | Literature |
|  | **1** | Lecture – 1 h. | * What is Geoinformatics, GIS
* Roles of Geoinformation systems
* How to collect GIS data
* Data types, collect and working with it.
* Data queries
 | [www.gislounge.com](http://www.gislounge.com)ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 5-7, თბილისი 2016 |
|  | Seminar -1 h.  | *View GIS Data**Case review, Discussion.* |  |
|  | **2** | Lecture – 1 h. | * Geospatial Data Analysis
* Geospatial Data Visualization
* Geospatial Data View
* Collecting and Organizing Geospatial Data
* Presentation of Geospatial Data – Raster Data and Vector Data
* Scale – Definition, Spatial Relations
 | Quantum GIS Training Manual: A Comprehensive Introduction to Quantum GISვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 9-13, თბილისი 2016 |
|  | Seminar -1 h. | *Analysis of geo data. Practical examples of organizing GIS data.**Case review, Discussion.* |  |
|  | **3** | Lecture – 1 h. | * QGIS (Quantum GIS) An Overview of the Interface and basic Tools
* Data View and Layout View (Composer)
* Layers, Data Frames, Map Elements
* Layer Properties
* Layer Symbolization
 | მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით, გვ 3-4.Quantum GIS Training Manual: A Comprehensive Introduction to Quantum GIS.[**www.gislounge.com**](http://www.gislounge.com) |
|  | Seminar -1 h. | *Overview of the main components of the Geoinformation Systems and the basic skills of working with them.**Case review, Discussion.* |  |
|  | **4** | Lecture – 1 h. | * Layer Symbology: Working on Qualitative Data
* Symbology: Working on Quantitative Data
* Classify Quantitative Data
* Symbols
* Layer Labeling and Style options
* Creating and saving “.qgis project” and “layer” files
 | QGIS Map Design by Anita Graser & Gretchen N. Peterson;მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით გვ. 5-6;[www.qgistutorials.com](http://www.qgistutorials.com)[www.mygeorgia.ge](http://www.mygeorgia.ge) |
|  | Seminar -1 h. | ***Quiz I****Understand the principles of data symbolization, practical use of classification with quantitative and qualitative data.* |  |
|  | **5** | Lecture – 1 h. | * Data Research Tools
* Data Selection
* Selection Types and Methodology
* Data Selection by Attributes
* Data Selection by Location
* Calculate Basic Statistics
 | Thinking About GIS;Getting Started with GIS Using QGIS;ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 49-54, თბილისი 2016[www.propertymap.tbilisi.gov.ge](http://www.propertymap.tbilisi.gov.ge)[www.mygeorgia.ge](http://www.mygeorgia.ge)[www.qgistutorials.com](http://www.qgistutorials.com) |
|  | Seminar -1 h. | *Creating selection, understanding of the importance of selection, compiling the selection proposal, calculating statistics.**Case review, Discussion.* |  |
|  | **6** | Lecture / Seminar – 1 h. | * Data Selection by Location
* Spatial Selection Types
* Spatial Selection and GIS Analysis
* Select by Location – Graphical example
* Calculate Basic Statistics based on Selected Data

***Seminar:***  *Spatial selection, review real examples and realizing the practical significance of the results based on it.* | ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 49-59, თბილისი 2016Thinking About GIS;Getting Started with GIS Using QGIS;[www.propertymap.tbilisi.gov.ge](http://www.propertymap.tbilisi.gov.ge)[www.mygeorgia.ge](http://www.mygeorgia.ge)[www.dataplus.ru](http://www.dataplus.ru)[www.qgistutorials.com](http://www.qgistutorials.com) |
|  | **Midterm Test I – 1 hour** |
|  | **7** | Lecture – 1 h. | * Geographical Data Representation
* Connection between Geographical object and Attributes
* Data Types
* Vector Attribute Data
* Raster and Vector Grids
 | ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 60-65, თბილისი 2016Getting Started with GIS Using QGIS;The Quantum GIS Training Manual;[www.gis.com](http://www.gis.com) |
|  | Seminar -1 h. | *Discussing about tools and principles of working with GIS data.**Case review, Discussion.* |  |
|  | **8** | Lecture – 1 h. | * Label Placement Options
* Label Rendering
* Group Labels
* Scale Definition
* Convert Labels into Annotations
* Deference between Labels and Annotations
 | QGIS Map Design by Anita Graser & Gretchen N. Peterson;მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით გვ. 14-16;www. stackoverflow.com[www.qgis.org](http://www.qgis.org) |
|  | Seminar – 1 h. | *Understanding the importance of Labelling. Make graphical drawings and different types of labelling.**Case review, Discussion.* |  |
|  | **9** | Lecture – 1 h. | * Database Structure
* Database Creating and Design Fundamentals
* Field Data Types
* Working with Attributes
* Data Relation
* Joins and Relations
* Charts and Diagrams
 | ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 42-50, თბილისი 2016[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  | Seminar – 1 h. | *Learn how to work with attributes, add/remove fields, making calculations and many types of diagrams.* *Case review, Discussion.* |  |
|  | **10** | Lecture – 1 h. | * Vector Data Editing Tools
* Data Maintenance
* Introduce Data Editing Functions
* Introduce other Editing Tools
* Difference between Database and Graphical Editing
* Differences between Database and Graphical Editing
* Working with sketches
 | მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით, გვ 22-25.[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  |  | **Quiz II, Presentations** |  |
|  | **11** | Lecture – 1 h. | * Snapping Definition
* Basic Editing Tools
* Field Calculator
* Calculating Data using Field Calculator, Formulas and examples.
* Editing Layer Attributes
 | მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით, გვ 7-16.[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  | Seminar – 1 h. | *Learn main principles of editing and how to do it.*  |  |
|  | **12** | Lecture / Seminar – 1 h. | * Coordinate Reference System (CRS)
* Geographic datum transformations
* Map projection and Distortions
* Projection Types
* Coordinate Systems Components
* Data Projection

***Seminar:*** *Understanding of projections and conversion, manipulations with them.* | მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით, გვ 12-17.[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  | **Midterm Test II – 1 hour** |
|  | **13** | Lecture – 1 h. | * What is Georeferencing?
* What is the Meaning of Georeferencing?
* Georeferencing different type of maps
* Georeferencing and Transformation Types
* Demonstrating Examples and Discuss about Georeferencing
* Work with Georeferenced Raster.
 | მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით, გვ 15-19.Making Spatial Decisions Using GIS: ISBN: 9781589482807 2011 172 pages.[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  | Seminar – 1 h. | *Georeferencing raster map.  Review the different methods of transformation.**Case review, Discussion.* |  |
|  | **14** | Lecture – 1 h. | * Basic Principles of Cartography
* The Main Goals of Cartography
* Factors that Determine Cartography
* Discussing about Different types of Maps
* GIS Systems in Cartography
 | ვ. ჩხაიძე, ი. სალუქვაძე. ინფორმაციული ტექნოლოგიები გეოგრაფიაში, გვ. 4-9, თბილისი 2016[www.mygeorgia.ge](http://www.mygeorgia.ge)[www.propertymap.tbilisi.gov.ge](http://www.propertymap.tbilisi.gov.ge)[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com)Esri Press |
|  | Seminar – 1 h. | *Understanding the mapping factors. Overview different types of maps.* |  |
|  | **15** | Lecture / Seminar – 1 h. | * Maps for Sharing Information
* Map Types
* Making Maps in QGIS
* Print Maps

***Seminar:*** *Case review, Discussion.* | QGIS Map Design by Anita Graser & Gretchen N. Peterson;მანუალი: როგორ შევქმნათ რუკა Qgis-ის გამოყენებით გვ. 25-29;Quantum GIS Training Manual: A Comprehensive Introduction to Quantum GIS;[www.qgis.org](http://www.qgis.org)[www.qgistutorials.com](http://www.qgistutorials.com)[www.gislounge.com](http://www.gislounge.com) |
|  | **Projects Presentations - 1 hour** |
| **Final Test - 2 hour** |

**Learning Outcomes and competencies:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Knowledge and understanding | Ability to use knowledge in practice | Ability to Make Decisions | Communication skills | Learning skills | Values |
| X | X | X | X | X |  |

**Information for students:**

**Plagiarism** - It is unacceptable, to present homework or idea without any reference to the source. In this case, the lecturer is obliged to leave the student without assessment.

**Copy / Dictation** - This action is forbidden on any type of activity (homework, exam, referral, presentation ...). In this case, the lecturer is obliged to leave the students without assessment.

**Intermediate assessment can be restored** if student has a valid reason (illness, necessity to be in the service at this hour). In order to restore interim assessment, the student should apply to the business school administration. The assessment date is defined by the lecturer. Discussions / debates are not subject to restoration.