

## Syllabus & schedule: MAR-E1046: BASICS of GIS\_Mapping Ecosystem Services in the Great Helsinki Region (Autumn Term 2019)

Code Aalto University: MAR-E1046

Duration: September-December 2019 (I and II period)

Students: 5-15 from Aalto University

CREDITS: 3-8 credits (3 credits: students attending lectures and doing the basic exercises; 8 credits, students developing in addition the proposed Case Study (Mapping Ecosystem Services in the Great Helsinki Region)

Responsible teacher: Juanjo Galan (Aalto University)

Teachers: Felix Bourgeau (GIS, PhD Candidate, Aalto\_ARTS), Juanjo Galan (Ecosystem Services: concept and assessment, Aalto-ARTS)

Support teachers:

- Joel Jalkanen: [https://tuhat.helsinki.fi/portal/en/persons/joel-jalkanen\(5f61db1d-44d2-402b-a77b-5948a8e59628\).html](https://tuhat.helsinki.fi/portal/en/persons/joel-jalkanen(5f61db1d-44d2-402b-a77b-5948a8e59628).html)
- Leena Holmila: <https://aaltodoc.aalto.fi/handle/123456789/31394>
- Elisa Lähde: <https://rekry.wsp.com/people/77109-elisa-lahde>
- Heidi Ahlgren: [https://www.espoo.fi/fi-fi/asuminen\\_ja\\_ymparisto/kaavoitus/Yleiskaava/Yhteystiedot](https://www.espoo.fi/fi-fi/asuminen_ja_ymparisto/kaavoitus/Yleiskaava/Yhteystiedot)

**GENERAL LEARNING OUTCOMES:** After completing the course, students understand the basics of GIS technology programs, are able to use them, and apply what they have learned in a study assignment.

### SPECIFIC LEARNING OUTCOMES (edition 2019 of the course):

- **Regarding GIS TOOLS:** After completing the course, the students will know and will be able to apply in practical cases the basics theories and software operations of Geoinformatics.
  - View, create, and modify spatial data and coordinate systems in a GIS
  - Run simple spatial analysis
  - Find data sources and utilize metadata
  - Create maps with GIS
  - Describe and use map algebra principles
  - Create field data from points
  - Create field data from points, field as a data type + Digital Elevation Model (DEM) and its derivatives + Generation of Digital Surface models (DSM) + Kernel density + Interpolation
- **Regarding ECOSYSTEM SERVICES IDENTIFICATION, MAPPING AND ASSESSMENT with GIS:** After completing the course, the students will:
  - Know the basics of Ecosystem Services regarding:
    - Types, Metrics and indicators
    - Interconnections between different Ecosystem Services
    - Interconnections to urban typologies and green types
    - Connections to Green-Blue Infrastructures in different scales (spatial networks)
  - Be able to Map Ecosystem Services and use them in Planning and Design according to existing methods
  - Formulate or assume critically methodologies for Ecosystem Services identification, mapping and assessment and apply them in a regional Case Study (Great Helsinki Region) by using effectively the possibilities provided by GIS

### SESSIONS:

Period I, II (Autumn term 2019), (9.9-16.12.2019, Mondays 9:15–12:00)

Place: Otakaari 1 (A046a and other computer classrooms), Aalto University (Otaniemi)

Public Reviews: one per assignment and a final review

Lectures:

On GIS: by GIS expert Felix Bourgeau (Doctoral researcher, landscape Architecture programme)

On Ecosystem Services: by Juanjo Galan and GIS external experts (Joel Jalkanen and Leena Holmila)

## **CONTENTS:** GIS technology methods in landscape planning

**DESCRIPTOR:** This course will explore the potential of GIS in landscape studies and planning by mapping (and assessing) different ecosystem services (regulating/supporting, provisioning and cultural as defined in the Millennium Ecosystem Services report: <https://millenniumassessment.org/documents/document.300.aspx.pdf> in the Great Helsinki Region

The objective of the course will be to maximize the use of GIS (Geographic Information Systems) in the identification, mapping (and assessment) of Ecosystem Services. and to explore existing or new methods for the implementation of the proposed works.

**INTRODUCTION:** How can Ecosystem Services be classified and assessed? Which kind of operation would be needed to identify, map and assess Ecosystem Services? How can these operations be conducted using GIS? How much and how can we integrate “objective” and “subjective” information”? How can computers help us in processing the increasing amount of available data? Can they create new layers of integrated information? Which algorithms should drive the combination and generation of those new layers? How can ecological and landscape studies, computation and map algebra be interconnected?...

In the course MAR-E1046 Basics of GIS we will try to answer all those questions by working simultaneously in the basics of GIS, in the principles of map algebra (combination of geographic data and spatial layers) and in their application on the identification, mapping (and assessment) of Ecosystem Services in the Great Helsinki Region. The course will combine an introductory part exploring the conceptual and practical potential of geographic information (part1) with a methodological research on the existing methods for Ecosystem Services mapping and assessment (part2). All the acquired knowledge will be applied in the Great Helsinki Region (part3), where the students will be invited to use or define their own methodology and to maximize the potential use of GIS in the development of their work

*General motto in education: There is no better way to learn something than teaching it to another person*

*Our motto in this course: There is no better way to learn something than teaching it to a computer...*

## **WORKLOAD:**

- Full Course (8 credits): Tutored studies 60 hours (practical lectures, tutored GIS exercises, revision of GIS exercises, seminars, review of Case Study Assignments, tutored studio work on the CASE STUDY), Independent studies 156 hours (readings, development of GIS Exercises and Assignments for the CASE STUDY), in total 216 hrs.
- Basic course (3 credits): Tutored studies 40,5 hrs (lectures, tutored exercises and observation of Assignment Reviews), independent study 40,5 hrs (readings, development of GIS Exercises), in total 81 hrs.

**ASSESSMENT:** The course will integrate some basic exercises for both the Full course and the Theoretical course students and some Assignments for the Full course students. The Assignments will be reviewed in public sessions and will include self/peer/teacher assessment. The exercises will be developed individually and the assignments in teams or individually.

Students attending the Basic course will have to do and pass all the GIS exercises and prepare a final report about the use of GIS in the works developed by the Full course students (the GIS exercises will count 60% of the final grade and the final report 40% of the final grade)

Students attending the Full course will have to do and pass all the GIS exercises and all the Assignments

- **GIS part\_ INDIVIDUAL WORK (20% of the final grade).** All the exercises will count 15% of the final grade of this part and will need to be submitted and passed. Teachers will be in charge of the evaluation. A diagnostic self-assessment will be carried out at the beginning of the course to adjust the contents and goals of the course if needed.
- **APPLICATION OF IS IN THE STUDY OF ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION\_ TEAM WORK (70% of the final grade).** The partial assignments will count 20% of the final grade of this part of this course and the final assignment 40%. All the assignments will need to be submitted and passed. Students and Teachers will be in charge of the evaluation (Peer Assessment 20%, Self-Assessment 10%, Teachers-

Assessment 70 %). A diagnostic self-assessment will be carried out at the beginning of the course to adjust the contents and goals of the course if needed.

- **TRANSVERSAL/SOFT SKILLS\_PER INDIVIDUAL (10% of the final grade).** The level of achievement in the learning outcomes connected to transversal/soft skills will be assessed by Students and Teachers (Self-Assessment (15%), Peer Assessment (25%), Teacher Assessment (60%). A diagnostic self-assessment will be carried out at the beginning of the course to adjust the contents and goals of the course if needed

**For more details about Learning Outcomes, Assessment Methods, Assessment Rubrics and Final Grade see APPENDIX 1**

The delay of submitted course work (assignments, etc.) affects its assessment:

- If the work is delayed but submitted by the FIRST official submission date of the Department (1. jälkipalautuspäivä), the grade is lowered with one point (i.e. 3 becomes 2),
- If the work is delayed but submitted by the SECOND official submission date of the Department (2. jälkipalautuspäivä), the grade is lowered with two points. (i.e. 3 becomes 1)
- At the end of the course the instructor may also accept unsubmitted work which is almost accomplished, but the unfinishedness of the work is taken into consideration in the grading and the earned credits.

**REGISTRATION FOR COURSES:** WebOodi. For the registration period see WebOodi

#### **STUDENTS & PREREQUISITES:**

- Master & PhD Students\_Landscape Architecture
- Master & PhD Students\_Architecture
- Students of the Creative Sustainability programme
- Master & PhD Students\_School of Engineering
- Master students from other disciplines related to Spatial Planning and/or Environmental Studies

**LANGUAGE OF INSTRUCTION:** English

**TEACHERS:** Juanjo Galan, Felix Bourgeau

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### **SCHEDULE** (the schedule might be changed according to the students' level in GIS)

**WEEK1 (9.9.2019, classroom R001/A046a)**

#### **GIS\_PART**

##### **Introduction to the course / GIS module**

##### **Why GIS**

Introduction to GIS and geoinformatics: Basic theories: coordinates & attributes; raster & vector (points, lines, polygons); categorical & continuous data; 2D, 3D + Examples of GIS + Why is GIS useful in MAPPING Ecosystem Services

##### **Getting started with a GIS**

##### **Getting started with ArcMap:**

View, layout, tools, layers, attribute table, help pages, tutorials, saving process

##### **Different types of data on a GIS:**

point, line, polygon, raster, basemap

##### **Selecting features manually**

Queries: Select by attributes, select by location; SQL; create layer from selected features

##### **Diagnostic self-assessment of General (Transversal skills) and Specific Learning Outcomes for the GIS part and Ecosystem**

##### **Services Parts + Discussion about the Criteria and Table of Rubrics for Peer and Self-Assessment**

##### **Presentation of Exercise1 (homework)**

#### **ECOSYSTEM SERVICES PART**

##### **Definition of teams and preselection of readings (Ecosystem services: concept, uses and mapping)**

**WEEK2 (16.9.2019, classroom R001/A046a)**

#### **GIS\_PART**

##### **Solution of Exercise1**

##### **Modifying data in a GIS: Data editing + Data conversion + Data from tables**

##### **Georeferencing**

**Coordinates and coordinate systems:** Theory + View, define and transform coordinates and coordinate systems

##### **Matching image with a background map**

##### **Presentation of Exercise2 (homework)**

### WEEK3 (23.9.2019, classroom U256)

#### GIS\_PART

Solution of Exercise2

**Simple spatial analysis tools:** Proximity tools + Overlay + Others

**Spatial Data Infrastructure:** Data sources + Metadata

Presentation of Exercise3 (homework)

#### ECOSYSTEM SERVICES PART

**Lectures: GIS and Ecosystem Services**

- 10:30-11:15 Heidi Ahlgren (City of Espoo)
- 11:15-12:00 Elisa Lähde (WSP Finland)

### WEEK4 (30.9.2019, classroom R001/A046)

#### GIS\_PART

Solution of Exercise3

**Communication by map:** Map versus Data + Data in a map + Map types + Elements of a map + Other practical issues + Export/Import to CAD, Illustrator

Presentation of Exercise4 (homework)

#### ECOSYSTEM SERVICES PART

**10:45- 11:40 Lecture: Principles of Ecosystem Services Mapping (by Joel Jalkanen)**

**11:40-12:00 REVIEW\_Reading seminar "Ecosystem services: concept, uses and mapping"\_1 (first group of teams)**

### WEEK5 (7.10.2019, classroom R001/A046)

#### GIS\_PART

Solution of Exercise4

**Map algebra:** Theory + Simple local functions + Simple focal functions + Simple zonal functions + More complex functions

Presentation of Exercise5 (homework)

#### ECOSYSTEM SERVICES PART

**10:45-11:40 Lecture: Methodologies for Ecosystem Services Mapping and examples (by Leena Holmila)**

**11:40 -12:00 REVIEW\_Reading seminar "Ecosystem services: concept, uses and mapping"\_1 (first group of teams)**

**Presentation of ASSIGNMENT1: "A method for Ecosystem Services Mapping in the Great Helsinki Region + identification of potential use of GIS"**

### WEEK6 (14.10.2019, classroom R001/A046)

#### GIS\_PART

Solution of Exercise5

**Analysis of Fields:** Field as a data type + Digital Elevation Model (DEM) and its derivatives + Generation of Digital Surface models (DSM) + Kernel density + Interpolation

Presentation of Exercise6 (homework)

### WEEK7 (21.10.2019, classroom R001/Y338)

#### GIS\_PART

Solution of Exercise6

**Recapitulation:** Examples of the use of GIS + General recap

#### ECOSYSTEM SERVICES PART

**REVIEW of ASSIGNMENT1: "A method for Ecosystem Services Mapping in the Great Helsinki Region + identification of potential use of GIS"**

**Peer/Self/Teacher Assessment of the achievement of General (transversal skills) and Specific Learning Outcomes in the assignment 1**

**Presentation of ASSIGNMENT2: Mapping Ecosystem Services at the Great Helsinki Region through GIS**

### WEEK8 (28.10.2019, classroom R001/U344)

**A ROAD TRIP ACROSS THE GREAT HELSINKI REGION (full day)**

### WEEK9 (4.11.2019, classroom R001/A046a)

#### Workshop\_ MAPPING & ASSESSING ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION THROUGH GIS

**Studio\_tutoring**

Methodology, First results and critical discussion about the use of GIS and about its potential use in planning

### WEEK10 (11.11.2019, classroom R001/U344)

#### Workshop\_ MAPPING & ASSESSING ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION THROUGH GIS

**Studio\_tutoring**

Pre-final results, critical discussion about the use of GIS and about its potential use in planning

### WEEK11 (18.11.2019, classroom R001/A046a)

#### Workshop\_ MAPPING & ASSESSING ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION THROUGH GIS

**REVIEW of ASSIGNMENT2: Mapping & Assessing Ecosystem Services at the Great Helsinki Region through GIS**

**Peer/Self/Teacher Assessment of the achievement of General (transversal skills) and Specific Learning Outcomes in the assignment 2**

**Presentation of ASSIGNMENT3: Assessing Ecosystem Services through GIS**

### WEEK12 (25.11.2019, classroom R001/A046a)

#### Workshop\_ ADVANCING IN THE MAPPING AND ASSESSMENT OF ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION THROUGH GIS (WITH POSSIBLE CONNECTIONS TO PLANNING)

**Studio\_tutoring**

Methodology, First results and critical discussion about the use of GIS and about its potential use in planning

**WEEK13 (2.12.2019, classroom R001/A046)**

**Workshop\_ ADVANCING IN THE MAPPING AND ASSESSMENT OF ECOSYSTEM SERVICES AT THE GREAT HELSINKI REGION THROUGH GIS (WITH POSSIBLE CONNECTIONS TO PLANNING)**

**REVIEW of ASSIGNMENT3: Advancing in the Mapping and Assessment of Ecosystem Services at the Great Helsinki Region through GIS (with possible connections to planning)**

**Peer/Self/Teacher Assessment of the achievement of General (transversal skills) and Specific Learning Outcomes in the assignment 3**

**WEEK14 (9.12.2019, classroom R001/Y338)**

**Workshop\_ PREPARING THE FINAL PRESENTATION: SYNTHESIS AND CONCLUSIONS**

**Studio\_tutoring**

**WEEK15 (16.12.2019, classroom R001/A046)**

**FINAL REVIEW**

**FINAL REVIEW (INCLUDING THE RESULTS OF THE ASSIGNMENTS (1, 2 and 3) 1 powerpoint + 2-3 A1 posters**

**Peer/Self/Teacher Assessment of the achievement of General (Transversal Skills) and all the Specific Learning Outcomes**

IMPORTANT NOTE: the specific contents of the assignments 2, 3 and 4 can be adjusted by each team according to their methodology and Schedule

## APPENDIX 1: ASSESSMENT

**ASSESSMENT METHOD:** The assessment methods of the course (e.g. assignments) will promote a combined exploration of theoretical concepts and their practical application. Further information given on MyCourses.

The final works will be assessed (Grading Scale: 0-5) by the responsible teacher with the support of the GIS teacher and the possible advice of external experts. In order to pass the course, all the assignments will have to be presented and passed.

The course will include the following Assessment and Feedback Types:

- **DIAGNOSTIC ASSESSMENT:** The initial level of the students will be assessed through a questionnaire and a short presentation prepared by each students expressing their expectations for the course. Tutors and Peers will provide an INITIAL FEEDBACK. This feedback will be based on the comparison of the initial level of the students, a joint analysis of the syllabus, learning outcomes and assessment rubrics of the course and a revision of the students' expectations. The objective of this feedback is to generate a shared understanding and agreement on the key learning components of the course introduce or reinforce aspects of the course that the students consider particularly relevant. The students will also self-asses their transversal/soft skills in order to emphasize the importance of these skills and to let them evaluate any possible progress on them during the course.
- **FORMATIVE ASSESSMENT:** This assessment will be based on the FORMATIVE FEEDBACK provided by Teachers and Peers in the review of exercises and partial assignments. This feedback will be informed by the Learning Outcomes and Assessment Rubrics of the course. The formative assessment and delivery of feedback will also take place in open discussions with peers and teachers as well as during the individual or team tutoring sessions with teachers. In the reviews, all the students and teams will be invited to give feedback to their peers. The reviews will include a final wrap-up in which the students or teams will summarize their feedback to activate a final discussion. This exercise should help to distillate the most relevant discussed issues, to interconnect all the feedback provided by/to the different teams and to avoid that the teams or individuals concentrate just in their own work and do not benefit from the group dynamics. This assessment will include also the self/peer/teacher assessment of transversal or soft skills (LO 0.1, 0.2, 0.3, 0.4 and 0.5) in order to let the students understand the importance of these skills and invite them to work on them during the course
- **SUMMATIVE AND FINAL ASSESSMENT:** The final works will synthetize all the work produced during the course and will be assessed (Grading Scale: 0-5) by the responsible teacher with the support of the GIS teacher and the possible advice of external experts. The assessment will be based on the level of achievement of the intended learning outcomes according to the agreed ASSESSMENT RUBRICS, the level of understanding of the course contents and the capacity to generate consistent, innovative and well-presented proposals. In addition, the critical, effective and constructive participation in the discussions of the course will be positively valued. The students will also be invited to make a final exercise of PEER AND SELF ASSESSMENT using the same ASSESSMENT RUBRICS. The final assessment will also include the self/peer/teacher assessment of transversal or soft skills (LO 0.1, 0.2, 0.3, 0.4 and 0.5) in order to let the students understand the importance of these skills for further studies.

ASSESSMENT RUBRICS					
GENERAL LEARNING OUTCOME	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
<b>LO 0.1:</b> Critical & Conceptual Thinking	No personal understanding of the concepts studied or used in the course	Sufficient but uncritical understanding of the concepts studied or used in the course	Good understanding of the concept studied in the course and identification of their limitations, gaps or inconsistencies	Formulation of key conceptual questions and potential answers after understanding the limitations or gaps in the studied concepts	Development of new or advanced conceptual frameworks on the base of a deep understanding of the studied concepts
<b>LO 0.2:</b> Empathy and Collaborative capacities	Disconnection from the discussions and learning processes developed during the course. Very low interest in receiving and producing feedback and in responding to the social environment of the course	Sufficient involvement in the discussions and learning processes developed in the course. Sufficient interest in providing and receiving feedback and in responding to the social environment of the course	Good and productive involvement in the discussions and learning processes developed in the course. Good interest in providing and receiving feedback and in responding to the social environment of the course	High level of involvement in the discussions and learning processes developed in the course. Good understanding of the learning processes and skills of peers and high capacity to provide and receive solid and constructive feedback and to respond to the social environment of the course	Exceptional level of involvement in the discussions and learning processes developed in the course. Deep understanding of the learning processes and skills of peers and very high capacity to provide and receive solid and constructive feedback and to respond to the social environment of the course
<b>LO.03:</b> Self-management	Very low to set personal objectives, to define a personal work plan and to adjust it in response to the development of the course. Very low capacity for effective time management	Low or sufficient capacity to set personal objectives, to define a personal work plan and to adjust it in response to the development of the course. Low or sufficient capacity for effective time management	Good capacity to set personal objectives, to define a personal work plan and to adjust it in response to the development of the course. Good capacity for effective time management	High capacity to set personal objectives, to define a personal work plan and to adjust it in response to the development of the course. High capacity for effective time management	Excellent capacity to set personal objectives, to define a personal work plan and to adjust it in response to the development of the course. Exceptional capacity for effective time management
<b>LO.04:</b> Capacities for Communication	Very low capacity to transmit information graphically, textually and orally. Low or sufficient capacity to engage with the audience and to adapt the provided information to the targeted audience	Low or sufficient capacity to transmit information graphically, textually and/or orally. Low or sufficient capacity to engage with the audience and to adapt the provided information to the targeted audience	Good capacity to transmit information graphically, textually and/or orally. Adequate capacity to engage with the audience and to adapt the provided information to the targeted audience	High capacity to transmit information graphically, textually and/or orally. High capacity to engage with the audience and to adapt the provided information to the targeted audience	Excellent capacity to transmit information graphically, textually and orally. Exceptional capacity to engage with the audience and to adapt the provided information to the targeted audience
<b>LO.05:</b> Capacity for Self & Peer assessment	Very low capacity to develop solid and reliable peer and self-assessment informed by the provided rubrics. No interest or capacity to generate new assessment criteria and rubrics on the base of a critical reflection about the key goals and results of the course	Low or average capacity to develop solid and reliable peer and self-assessment informed by the provided rubrics. Low interest or capacity to generate new assessment criteria and rubrics on the base of a critical reflection about the key goals and results of the course	Good capacity to develop solid and reliable peer and self-assessment informed by the provided rubrics. Incipient capacity to generate new assessment criteria and rubrics on the base of a critical reflection about the key goals and results of the course	High capacity to develop solid and reliable peer and self-assessment informed by the provided rubrics. Sufficient capacity to generate new assessment criteria and rubrics on the base of a critical reflection about the key goals and results of the course	Excellent capacity to develop solid and reliable peer and self-assessment informed by the provided rubrics. Good capacity to generate new assessment criteria and rubrics on the base of a critical reflection about the key goals and results of the course

SPECIFIC LEARNING OUTCOME	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
<b>LO 1.1:</b> View, create, and modify spatial data and coordinate systems in a GIS	Low capacity to view, create, and modify spatial data and coordinate systems in a GIS	Sufficient capacity to view, create, and modify spatial data and coordinate systems in a GIS	Good capacity to view, create, and modify spatial data and coordinate systems in a GIS	High capacity to view, create, and modify spatial data and coordinate systems in a GIS	Excellent capacity to view, create, and modify spatial data and coordinate systems in a GIS
<b>LO 1.2:</b> Run simple spatial analysis with GIS	Low capacity to run simple spatial analysis with GIS	Sufficient capacity to run simple spatial analysis with GIS	Good capacity to run simple spatial analysis with GIS	High capacity to run simple spatial analysis with GIS	Excellent capacity to run simple spatial analysis with GIS
<b>LO 1.3:</b> Find data sources and utilize metadata in GIS	Low capacity to run simple spatial analysis with GIS	Sufficient capacity to run simple spatial analysis with GIS	Good capacity to run simple spatial analysis with GIS	High capacity to run simple spatial analysis with GIS	Excellent capacity to run simple spatial analysis with GIS
<b>LO 1.4:</b> Create maps in GIS	Low capacity to create maps in GIS	Sufficient capacity to create maps in GIS	Good capacity to create maps in GIS	High capacity to create maps in GIS with a high quality both in legibility of the contents, and visual quality	Excellent capacity to create maps in GIS with a very high quality, both in legibility of the contents, and visual quality
<b>LO 1.5:</b> Describe and use map algebra principles with GIS	Low capacity to use map algebra principles with GIS and produce new and meaningful layers of information by combining existing ones	Sufficient capacity to use map algebra principles with GIS and produce new and meaningful layers of information by combining existing ones	Good capacity to use map algebra principles with GIS and produce new and meaningful layers of information by combining existing ones	High capacity to use map algebra principles with GIS and produce new and meaningful layers of information by combining existing ones	Excellent capacity to use map algebra principles with GIS and produce new and meaningful layers of information by combining existing ones
<b>LO 1.6:</b> Create field data from points	Low capacity to create field data from points	Sufficient capacity to create field data from points	Good capacity to create field data from points	High capacity to create field data from points	Excellent capacity to create field data from points
<b>LO 1.7:</b> Apply GIS tools in the identification, mapping and assessment of Ecosystem Services in the Great Helsinki Region	Low capacity to use GIS tools to identify, map and assess Ecosystem Services	Sufficient capacity to use GIS tools to identify, map and assess Ecosystem Services	Good capacity to use GIS tools to identify, map and assess Ecosystem Services	High capacity to use GIS tools to identify, map and assess Ecosystem Services	Excellent capacity to use GIS tools to identify, map and assess Ecosystem Services
<b>LO 2.1</b> Understand and apply the basics of Ecosystem Services regarding: <ul style="list-style-type: none"> <li>Types, Metrics and indicators</li> <li>Interconnections between different Ecosystem Services</li> <li>Interconnections to urban typologies and green types</li> </ul>	Low understanding and capacity of application in landscape and urban planning of the Ecosystem Services concept (types, metrics, indicators, interconnections and links to urban and green types)	Sufficient understanding and capacity of application in landscape and urban planning of the Ecosystem Services concept (types, metrics, indicators, interconnections and links to urban and green types)	Good understanding and capacity of application in landscape and urban planning of the Ecosystem Services concept (types, metrics, indicators, interconnections and links to urban and green types)	High understanding and capacity of application in landscape and urban planning of the Ecosystem Services concept (types, metrics, indicators, interconnections and links to urban and green types)	Excellent understanding and capacity of application in landscape and urban planning of the Ecosystem Services concept (types, metrics, indicators, interconnections and links to urban and green types)
<b>LO 2.2.</b> Capacity to Map Ecosystem Services and use them in Planning and Design according to existing methods	Low capacity to map Ecosystem Services and use them in Planning and Design according to existing methods	Sufficient capacity to Map Ecosystem Services and use them in Planning and Design according to existing method	Good capacity to map Ecosystem Services and use them in Planning and Design according to existing method	High capacity to map Ecosystem Services and use them in Planning and Design according to existing method	Excellent capacity to map Ecosystem Services and use them in Planning and Design according to existing method
<b>LO 2.3</b> Formulate or assume critically methodologies for Ecosystem Services identification, mapping and assessment and apply them in a Case Study by using effectively the possibilities provided by GIS	Low or no capacity to analyze critically existing methodologies for the proposed goal and to modify or generate new ones	Average capacity to analyze critically existing methodologies for the proposed goal and to modify or generate new ones	Good capacity to analyze critically existing methodologies for the proposed goal and to modify or generate new ones	High capacity to analyze critically existing methodologies for the proposed goal and to modify or generate new ones	Excellent capacity to analyze critically existing methodologies for the proposed goal and to modify or generate new ones



	Exercise or Assignment	Weight in the PART	Assessed Learning Outcomes	Peer-Self Assessment / Pedagogical actions	Main Function of the Assessment
<b>TRANSVERSAL SKILLS</b>	Personal self-assessment	No weight	Personal pre-diagnosis: LO 01, 02, 03, 04, 05	Self-diagnostic assessment. This information will permit to adjust slightly the goals & contents of the course	DIAGNOSTIC
<b>PART1_ GIS TOOLS (20% of final grade).</b> All the Exercises need to be passed  <b>GIS TOOLS (20% of final grade).</b> All the Exercises need to be passed	Personal SWOT about the level of the student in LO 1.1, LO 1.2, LO 1.3, LO 1.4, LO 1.5, LO 1.6	No weight	Personal pre-diagnosis: • LO 1.1, LO 1.2, LO 1.3, LO 1.4, LO 1.5, LO 1.6	Self-diagnostic assessment. This information will permit to adjust slightly the goals & contents of the course	DIAGNOSTIC
	Exercise 1	15%	LO 1.1		FORMATIVE
	Exercise 2	15%	LO 1.2		FORMATIVE
	Exercise 3	15%	LO 1.3		FORMATIVE
	Exercise 4	15%	LO 1.4		FORMATIVE
	Exercise 5	15%	LO 1.5		FORMATIVE
	Exercise 6	15%	LO 1.6		FORMATIVE
Final assessment PART1			LO 1.1, LO 1.2, LO 1.3, LO 1.4, LO 1.5, LO 1.6	<ul style="list-style-type: none"> <li>• Self-assessment of the course according to table of rubrics (LO1.1-LO 1.6). (20% of grade in PART1).</li> <li>• Teachers assessment (based on Exercises): 80% of grade in Part1</li> </ul>	SUMMATIVE
<b>ECOSYSTEM SERVICES IDENTIFICATION, MAPPING AND ASSESSMENT with GIS (70% of final grade)</b>  All the Assignments need to be passed	Personal SWOT about the preliminary level of the student in the 2.1, LO 2.2, LO 2.3	No weight	Personal pre-diagnosis for LO- 2.1, LO 2.2, LO 2.3	Self-diagnostic assessment. This information will permit to adjust slightly the goals & contents of the course	DIAGNOSTIC
	Assignment 1	20%	LO 2.3 No for grading (LO 01, 02, 03, 04, 05)	GROUP WORK: Peer & Self-Assessment LO2.3	FORMATIVE
	Assignment 2	20%	LO 2.1+2.2+2.3 No for grading (LO 01, 02, 03, 04, 05)	GROUP WORK: Peer & Self-Assessment LO2.2	FORMATIVE
	Assignment 3	20%	LO 2.1+2.2+2.3 No for grading (LO 01, 02, 03, 04, 05)	GROUP WORK: Peer & Self-Assessment LO2.1	FORMATIVE
	FINAL Assignment	40%	LO 1.7, LO 2.1, LO 2.2, LO 2.3	GROUP WORK: Peer & Self-Assessment LO2.1+LO2.2+LO2.3 (Peer Assessment 20%, Self-Assessment 10%, Teachers-Assessment 70 % of grade in PART2)	INTEGRATIVE & SUMMATIVE
<b>TRANSVERSAL SKILLS (10% of final grade)</b>	Questionnaire	(+0,5 (grade 4) -1 (grade 5) points)	LO 01, 02, 03, 04, 05	Self-Assessment (15%) Peer Assessment (25%) Teacher Assessment (60%)	INTEGRATIVE & SUMMATIVE