

**Title: Remote Sensing (RS), Geographical Information Systems and Analysis:
Theory and Application**

Lecturer: Andi Besse Rimba

Course Description:

The course aims to provide an introductory understanding of the concepts and principles of Geographical Information Systems (GIS) and remote sensing (RS) and their applications to social-ecological research, management planning, and decision making. This course is divided into two parts. The first part will introduce fundamental concepts of GIS, including some important and commonly used geoprocessing and spatial analysis tools and techniques, such as vector-raster conversion, proximity, surface interpolation, reclassification, map algebra, cross tabulation, and zonal analysis. The second part will focus on RS satellite data processing, including the derivation of various spectral indices and some examples of satellite image classification methods. All of these will be achieved through a series of lectures and guided hands-on training sessions. The course will use QGIS software package.

Learning Outcomes:

The overall goal of this course is for students to gain some understanding of the concepts and principles of GIS and RS, and their applications to social-ecological research, management planning, and decision making. By the end of the course, students will be able to execute some important GIS tools and techniques and process RS data. They will be able to perform at least basic spatial analysis and identify some important social-ecological problems that can be supported by spatial analysis with the use of GIS and RS. Finally, they will be able to connect the outcomes of GIS/RS-based analyses to existing knowledge, management planning, decision making and support their research.

Assessment:

Attendance and class participation	: 20 %
Exercises	: 20 %
Essay (exam) (20 June 2023) and oral presentation (27 June 2023)	: 60 %

Course Outline:

Session	Outline	Date and time	Modality
1	Class introduction (lecturers, students (background and topic interest) and class requirements)	Tuesday May 9, 2023 (9:30-13:00)	In-person
	Lecture: Introduction to GIS and Applications of GIS		
2	Hands-on-training: installing QGIS and Overview of QGIS interface		
3	Lecture: Data sources and software packages	Tuesday May 16, 2023 (9:30-13:00)	In-person
4	Hands-on-training: Vector data handling: Geo-referencing, digitizing, and editing		
5	Hands-on-training: Database handling: Create tabular data, convert data from other sources	Tuesday May 23, 2023 (9:30-13:00)	In-person
6	Hands-on-training: Data represent and Layout		
7	Lecture: Introduction to RS and applications of RS	Tuesday May 30, 2023 (9:30-13:00)	In-person
8	Hands-on-training: Satellite image downloading, Satellite image acquisition		
9	Hands-on-training: RS data processing: Image classification (Unsupervised and supervised classification) calculate the accuracy	Tuesday June 6, 2023 (9:30-13:00)	In-person
10	Hands-on-training: Spatial analysis (1) Vector-raster conversion, proximity, surface interpolation		
11	Hands-on-training: Spatial analysis (2) Reclassification, map algebra, cross tabulation, zonal analysis	Tuesday June 13, 2023 (9:30-13:00)	In-person
12	Hands-on-training: Study case: Advanced spatial analysis and modeling with GIS and RS		
13	Lecture: GIScience and RS for the society (SDG, etc.) Consultation about presentation (progress, issues, etc.)	Tuesday June 20, 2023 (9:30-13:00)	In-person
14	Essay (exam)		
15	Oral presentation	Tuesday June 27, 2023 (11:20-13:00)	In-person

Essential Reading

- https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesgis.pdf
- https://webapps.itc.utwente.nl/librarywww/papers_2009/general/PrinciplesRemoteSensing.pdf

Useful Links

- https://docs.qgis.org/3.16/en/docs/training_manual/index.html
- <https://earthdata.nasa.gov/learn/remote-sensing>

Scientific Journals

- Annals of GIS, International Journal of Geographical Information Science, Transactions in GIS, Applied Geography, GIScience & Remote Sensing, Remote Sensing of Environment, ISPRS Journal of Photogrammetry and Remote Sensing, etc.

Important Information

Class Conduct & Etiquette

Students are expected to arrive on time and not to engage in disruptive behavior during class. This includes, among other things, private side conversations, the use of cell-phones and other electronic devices, or the reading of newspapers. Cell-phones should be switched off and stored in the bag. We wish to create an atmosphere of open and tolerant discussion in the classroom and request students to recognize every individual's right to have an opinion. The lecturer and other students should be treated with dignity and respect, in particular in discussions on contentious political issues where a diversity of opinion is likely to arise. However, we also recognize that there are limits to tolerance and the lecturer reserves the right to request disciplinary action against any student who violates this policy or repeatedly shows disruptive behavior in class.

Computer Use in Class

The use of computers (including tablets) in the classroom is restricted to taking notes, reading of the course material or searching for course related information in the internet. Any disruption of the class by cell phones, instant messaging programs or other communication devices will not be tolerated. The lecturer reserves the right to revoke this permission if a student is found using a computer for any non-course related activities.

Plagiarism & Academic Misconduct

Please be aware that the consequences of plagiarism are severe and students found guilty of academic misconduct will be punished in accordance with UNU's academic honesty policies. The lecturer reserves the right to run all assignments through an anti-plagiarism software provided by the UNU. If evidence of academic misconduct on the assigned presentations, the mid-term exam or the final essay should be found, the assignment will receive a failing grade. In case of repeated violations of academic conduct, the student may receive a failing grade for the entire course and will be reported to the appropriate authorities for disciplinary action.