Course Information

Year	AY 2025-2026	School	UNU-IAS
Course Title	Remote Sensing, Geographical Information Systems and Analysis: Theory and Application		
Instructor & Contact Information	Shengru Li (s.li@unu.edu)		
Term/Day/Period	AY 2026 Spring / May-June 2026		
Category	Elective Course	Eligible Year	1st year and above Credits 2
Classroom	Lecture room, 6th floor in the UNU building	Campus	UNU-HQ, Tokyo, Japan
Main Language	English		
Class Modality Categories	On-Campus		
Course Code	RGIS		
Level	Graduate-level	Types of lesson	Lecture

Syllabus Information

Subtitle	**No subtitle**
Course Description (Word limit: 200)	*This course introduces the ideas and practices of geographic information systems (GIS) and remote sensing (RS) and how they apply to social-ecological research, management planning, and decision-making. There are two sections to this course. The first section will cover basic GIS principles and some significant and often used geoprocessing and spatial analysis tools and techniques, including vector-raster conversion, proximity, surface interpolation, reclassification, map algebra, and zonal analysis. The second section will primarily focus on processing RS satellite data, including developing many spectral indices and particular applications of satellite image classification methods. A sequence of talks and supervised practical training sessions will accomplish these goals. QGIS software will be used in training.*
Objectives and Learning Goals (Bullet points)	• Understand fundamental GIS concepts and be able to manage, analyze, and visualize spatial data using QGIS, including working with vector/raster data models, projections, geoprocessing tools, and cartographic design. • Learn core remote sensing principles and apply them to acquire, preprocess, enhance, and classify satellite imagery, including working with EM spectrum properties, indices (e.g., NDVI), supervised classification, and accuracy assessment. • Plan and implement a project to analyse a real policy‑relevant spatial problem, integrating GIS and RS techniques including data acquisition, data cleaning and analysis, mapping, and evidence‑based recommendations.

	The course requirements include active class participation, exercise and assignment, final report, and oral presentation. Attendance and class participation: 20 % (More than 80% attendance is required) Final Report: 60% Oral presentation: 20 %

Course Outline

Detailed information could be provided on Moodle such as the information of the lecturers, etc.

Lecture	Outline
1	Introduction to GIS & geospatial thinking
2	Hans-on-training: QGIS installation, interface & basic operations
3	Lecture: spatial data sources, formats & open geospatial ecosystems
4	Hands-on-training: georeferencing, digitizing & vector editing
5	Hands-on-training: database handling, joins & attribute management
6	Hands-on-training: cartography & SDG-aligned map design
7	Lecture: fundamentals of remote sensing
8	Hands-on-training: satellite data acquisition & preprocessing
9	Hands-on-training: spatial analysis I - conversion, interpolation & proximity
10	Hands-on-training: spatial analysis II: reclassification, map algebra & zonal statistics
11	Hands-on-training: remote sensing classification & accuracy assessment
12	Hands-on-training: GIS + RS integration for SDG Indicators (UNESCAP)
13	Hands-on-training: Japan focused spatial policy applications (MLIT)
14	Workshop for project and presentation
15	Presentation

Course Readings

Huisman, O., & de By, R. A. (2009). Principles of geographic information systems : an introductory textbook. (ITC Educational Textbook Series; Vol. 1). International Institute for Geo-Information Science and Earth Observation.

Tempfli, K., Huurneman, G. C., Bakker, W. H., Janssen, L. L. F., Feringa, W. F., Gieske, A. S. M., Grabmaier, K. A., Hecker, C. A., Horn, J. A., Kerle, N., van der Meer, F. D., Parodi, G. N., Pohl, C., Reeves, C. V., van Ruitenbeek, F. J. A., Schetselaar, E. M., Weir, M. J. C., Westinga, E., & Woldai, T. (2009). Principles of remote sensing: an introductory textbook. (ITC Educational Textbook Series; Vol. 2). International Institute for Geo-Information Science and Earth Observation.

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.

Reference — N/A

Rate	%	Evaluation Criteria
Attendance and class participation	20	Attendance and class participation
Final Report	60	Reasoning in methodology Data analysis Interpretation of results Scientific communication quality
Oral Presentation	20	Presentation and communication quality (aesthetics, clarity in delivering ideas, logical persuasion, story coherence)

UNU
IAS