Course Syllabus

Course: GeoAI Scientific Writing, Research Communication, and Publication

This course is developed initiatively by Prof. Saied Pirasteh from the project entitled “AI-Enabled enhancing the geospatial information capabilities of countries to support the Sustainable Development Goals (SDGs)”, under the 2026 ISPRS Education and Capacity Building Initiatives Project (ECBI2026).

Course Syllabus

Department: Institute of Artificial Intelligence
Program Level: Upper Undergraduate / Graduate
Credit Value: 3 Credits
Delivery Mode: Hybrid / In-Person
Semester Length: 13 Weeks
Prerequisites: Introduction to GIS, Remote Sensing, Geomatics, Computer Science, Data Science, or permission of instructor

This course is designed to provide a complete university-level syllabus focused on GeoAI scientific writing, research communication, and publication development. GeoAI research and applications cover:

- Scientific publication writing
- GeoAI discourse communities
- Research proposal development
- Journal and conference publishing
- Responsible AI and GeoAI ethics
- AI-assisted scientific writing workflows

The course includes:

- Course description
- Learning outcomes
- Weekly schedule (13 weeks)
- Assignments and grading
- Publication-focused activities
- GeoAI-specific readings
- AI policy
- Research tools and software
- Example student research topics
- Career relevance and future extensions

It is suitable for upper undergraduate or graduate students in GIS, remote sensing, geomatics, AI, data science, geography, environmental science, and related programs.

Course Description

This course introduces students to academic writing, scientific communication, and publication practices within the rapidly evolving field of Artificial Intelligence (AI) and Geospatial Artificial Intelligence (GeoAI). The course combines foundations of scholarly writing with applied AI and GeoAI research practices, enabling students to develop technical, analytical, and publication-oriented competencies.

Students will learn how to write and publish scientific papers in AI and GeoAI-related domains, including remote sensing, geospatial data science, GIScience, Earth observation, machine learning, deep learning, digital twins, disaster management, urban systems, environmental monitoring, and spatial decision support systems and beyond.

The course adopts a "Writing About AI and GeoAI Research" approach in which students analyze scientific discourse communities, research genres, rhetorical structures, peer-reviewed publications, and scholarly communication conventions specific to GeoAI and geospatial sciences.

Students will gain practical experience in:

- Scientific research writing
- AI tools and GeoAI literature review development
- Research proposal writing
- Journal paper structuring
- Scientific visualization and mapping
- AI and GeoAI conference presentation design
- Peer review and editorial response writing
- Research ethics and responsible AI
- Standardization considerations
- Academic publishing workflows
- Citation management and scholarly communication
- Human-AI collaborative writing methodologies

The course also introduces responsible and ethical uses of Generative AI tools for scientific writing support, brainstorming, editing, coding assistance, and research communication.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Analyze AI and GeoAI discourse communities, publication ecosystems, and scholarly communication practices.
2. Critically evaluate peer-reviewed AI and GeoAI publications and identify rhetorical structures in scientific writing.
3. Conduct systematic literature reviews in AI, GeoAI and geospatial sciences.
4. Write clear, coherent, and publication-ready scientific manuscripts.
5. Develop research questions, hypotheses, and methodological frameworks for AI and GeoAI studies.
6. Apply appropriate citation, referencing, and academic integrity practices.
7. Produce scientific figures, tables, maps, and visualizations suitable for publication.

8. Prepare conference abstracts, posters, oral presentations, and journal submissions.
9. Conduct constructive peer review and revise manuscripts based on feedback.
10. Understand ethical and standardization considerations related to AI, geospatial data, bias, reproducibility, and responsible GeoAI.
11. Use AI-assisted tools responsibly to support academic research and writing.
12. Build a professional academic portfolio in GeoAI.

Course Objectives

The course is designed to:

- Strengthen students' scientific writing skills in GeoAI.
- Improve students' research communication competencies.
- Introduce publication strategies in geospatial and AI journals.
- Familiarize students with interdisciplinary AI and GeoAI research communities.
- Develop students' capacity for critical reading and synthesis.
- Prepare students for graduate studies, conference participation, and scientific publishing.

Target Audience

This course is suitable for students in:

- AI and Computer Science
- Geomatics Engineering
- GIScience
- Geography
- Environmental Science
- Remote Sensing
- Urban Planning
- Earth Observation
- Disaster Management
- Civil Engineering
- Data Science
- Sustainability and SDG-related programs

Teaching and Learning Approach

The course integrates:

- Lectures
- Research article discussions
- Writing workshops
- AI and GeoAI case studies
- Peer-review sessions
- Hands-on publication exercises
- Research proposal development
- Collaborative learning
- Scientific presentation activities

- AI-assisted writing labs

Students will engage with real AI and GeoAI publications from journals such as but not limited to:

- ISPRS Journal of Photogrammetry and Remote Sensing
- Transactions in GIS
- Remote Sensing
- IEEE JSTARS and TGRS
- International Journal of Applied Earth Observation and Geoinformation
- Computers, Environment and Urban Systems
- GIScience & Remote Sensing
- Nature Scientific Reports
- Environmental Modelling & Software

Course Topics and Weekly Schedule

Week 1- Introduction to AI, GeoAI and Scientific Communication

Topics

- Introduction to AI and GeoAI
- Evolution of GIS, Remote Sensing, AI, and GeoAI
- What is scientific writing?
- GeoAI research ecosystems
- Understanding scholarly communication
- Academic discourse communities in AI and GeoAI

Activities

- Course orientation
- Writing a diagnostic assessment
- Discussion on major AI and GeoAI journals and conferences

Readings

- Selected AI and GeoAI overview papers
- Responsible AI and GeoAI framework articles

Assignment

- Writing Reflection: “My Journey Toward AI and GeoAI Research”

Week 2- Research Foundations and Literature Review

Topics

- Identifying research gaps
- Research questions and hypotheses
- Literature review methodologies
- Reading scientific papers efficiently
- Critical analysis techniques
- Citation tracking and bibliometric analysis

Activities

- Literature search workshop
- Scopus/Web of Science/Google Scholar exercise

Tools

- Zotero
- Mendeley
- Connected Papers
- Semantic Scholar

Assignment

- Annotated bibliography

Week 3- GeoAI Discourse Communities and Research Cultures

Topics

- AI and GeoAI scholarly communities
- Interdisciplinary research communication
- Scientific collaboration networks
- Research identity and academic positioning
- International publication culture

Activities

- Analysis of conference proceedings
- Discussion of interdisciplinary communication challenges

Assignment

- Discourse Community Analysis in AI and GeoAI

Week 4- Structure of Scientific Papers in AI and GeoAI

Topics

- IMRAD structure

- Abstract writing
- Introduction development
- Methodology writing
- Results and discussion sections
- Conclusion and future work

Activities

- Journal article dissection workshop
- Reverse outlining exercise

Assignment

- Draft structured paper outline

Week 5- Writing Literature Reviews and Theoretical Frameworks

Topics

- Narrative vs systematic reviews
- Thematic synthesis
- Conceptual frameworks
- Writing coherence and logical flow
- Identifying novelty and contribution

Activities

- Literature mapping workshop
- Conceptual framework design

Assignment

- Literature review draft

Week 6- GeoAI Methodologies and Technical Writing

Topics

- Writing machine learning methodologies
- Deep learning workflows
- Spatial analysis methods
- Earth observation workflows
- Geospatial data processing documentation
- Reproducibility and transparency

Activities

- Technical writing workshop
- AI and GeoAI workflow documentation exercise

Assignment

- Methodology section draft

Week 7- Scientific Visualization and Geospatial Communication

Topics

- Cartographic communication
- Scientific figures and tables
- Map design principles
- Dashboard storytelling
- Visualization ethics
- Infographics for scientific communication

Activities

- GeoAI map critique session
- Figure redesign workshop

Software

- Online ArcGIS
- ArcGIS Pro
- QGIS
- Python visualization libraries
- Tableau / Power BI

Assignment

- Publication-quality figure portfolio

Week 8- Responsible AI and GeoAI, Ethics, standards, and Academic Integrity

Topics

- Ethical and standards AI in geospatial sciences
- Bias in GeoAI models
- Data privacy and surveillance concerns
- Responsible data governance
- Plagiarism and academic misconduct
- Ethical use of Generative AI
- Reproducibility and open science

Activities

- Case study analysis
- Debate on ethical GeoAI systems

Assignment

- Ethics and standards reflection paper

Week 9- Research Proposal Writing in AI and GeoAI

Topics

- Proposal structure
- Research objectives and significance
- Funding agency expectations
- Methodology planning
- Timeline and budgeting
- SDG alignment

Activities

- Proposal critique workshop
- Grant-writing discussion

Assignment

- Mini GeoAI research proposal

Week 10- Journal Selection, Peer Review, and Publishing Process

Topics

- Selecting appropriate journals
- Understanding impact factors and indexing
- Peer review process
- Editorial decision-making
- Predatory journals
- Writing response letters to reviewers

Activities

- Mock peer review
- Reviewer comment analysis

Assignment

- Peer review report

Week 11- Conference Papers, Posters, and Scientific Presentations

Topics

- Writing conference abstracts
- Designing scientific posters
- Oral presentation techniques
- Communicating complex GeoAI concepts
- Science communication for policy and industry

Activities

- Student presentations
- Poster development workshop

Assignment

- Conference abstract and poster

Week 12- AI-Assisted Scientific Writing and Research Automation

Topics

- Generative AI for scientific writing
- Prompt engineering for academic work
- AI-supported coding and data analysis
- Risks and limitations of AI-generated content
- Human-AI collaborative research
- GeoAI-GPT systems and intelligent geospatial assistants

Activities

- AI-assisted writing lab
- Prompt design exercise

Assignment

- AI-assisted writing reflection and workflow documentation

Week 13- Final Portfolio Presentations and Future Directions

Topics

- Future of GeoAI research
- Research career development
- Building publication portfolios
- Interdisciplinary collaboration
- Open science and global sustainability

Activities

- Final presentations
- Peer feedback sessions
- Course reflection

Final Submission

- Final GeoAI Publication Portfolio

Assessment Methods

The following evaluation components will be used to determine the course grade.

Component 1 – Examinations & assignments:	
Quiz/Test 1	10%
Quiz/Test 2	10%
Attendance/Participation/In-class/outside class assignments (readings' reflection, worksheets, quizzes, etc.)	10%
Component 2 –hands-on assignments:	
Minimum 3 assignments (weights vary with assignment)	10%
Group Oral presentation (to be scheduled during the course)	20%
Component 3 – Term project assignment:	
Comprehensive term project report/article	40%

Exemptions to the Examination and Tests Regulations (if applicable)

If there are exempted to the Examination and Tests regulations which are made on pedagogical grounds (with the approval of the Dean or the Dean's designate) they must be clearly stated here.

Grading System

96 – 100	A+	77 – 80	B	59 – 61	C-
90 – 95	A	71 – 76	B-	55 – 58	D+
86 – 89	A-	65 – 70	C+	50 – 54	D
81 – 85	B+	62 – 64	C	0 – 49	F

A+	4.00	Outstanding performance
A	4.00	Excellent performance
A-	3.70	Approaching excellent performance
B+	3.30	Exceeding good performance
B	3.00	Good performance
B-	2.70	Approaching good performance
C+	2.30	Exceeding satisfactory performance
C	2.00	Satisfactory performance
C-	1.70	Approaching satisfactory performance.
D+	1.30	Marginal pass. Insufficient preparation for subsequent courses in the same subject
D	1.00	Minimal Pass. Insufficient preparation for subsequent courses in the same subject.
F	0.00	Failure. Did not meet course requirements.