

Royal University of Bhutan
Samtse college of Education
Work plan – PHG501 (Physical Landform Studies)
M.Ed. Geography, Autumn 2020.

Week	Module Unit	Topical Focus	Learning Outcomes	Activities/Strategies	Assessment	Resources	VLE Platform
1	Course Introduction		- Describe course outcomes and expectations	Synchronous Discussion: Instructor Introduction Develop community contract and class norms Online geospatial technology application.	VLE Assignment: Educator Reflection		Uploaded Work plan Module Descriptor
2	Unit 1: Introduction to Remote Sensing	Fundamentals of Remote Sensing	- Describe the history and conceptual foundations of remote sensing. -Explain the rationale for using remote sensing across different applications.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	VLE Discussion post and peer responses.	Uploaded Reading Linked Videos Online Geospatial Application	Discussion Forum
3		Introduction to Electromagnetic Radiation	- Discuss the foundational concepts of electromagnetic radiation as applied to remote sensing	Synchronous Discussion Collaborative practical using online geospatial application	Practical 1 - Spectral Properties	Uploaded Reading Linked Videos	Assignment Post
4		Review of Sensors and Data Acquisition	- Describe the various sensor types and platforms available. - Compare the different types of resolution for imagery.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	Practical 2 – Vegetation Analysis	Uploaded Reading Linked Videos	Assignment post
5		Imagery Interpretation and Enhancement	- Apply the basic concepts of spectral analysis to interpret a remotely sensed image.	Synchronous Discussion Collaborative practical using online geospatial application	Practical 3 – Land use classification	Uploaded Reading Linked Videos	Assignment post
6		Applications of Remote Sensing	- Evaluate the suitability of different sensors and techniques for applied remote sensing problems.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	Practical 4 – Remote Sensing for Natural hazards	Uploaded Reading Linked Videos	Assignment post
7			Fundamentals of Geographic Information	- Describe the history and conceptual	Synchronous Discussion	Geospatial Inquiry Project	Uploaded Reading

	Unit 2: Introduction to Geographic Information Systems	Systems (GIS)	foundations of GIS. -Explain the rationale for using GIS across different applications.	Collaborative practical using online geospatial application	Proposal		
8		GIS Data Acquisition	- Differentiate between the different types of GIS data. - Identify relevant GIS data collections and repositories.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	Project Proposal Final Draft	Uploaded Reading Linked Videos	Group Discussion
9		Data Preparation and Management	- Apply standard data preparation procedures to appropriately prepare, clean, and curate GIS data.	Synchronous Discussion Collaborative practical using online geospatial application	Practical 5 – Working with GIS Data	Uploaded Reading	Assignment post
10		Spatial Data Analysis	- Perform basic spatial analysis in GIS to interpret patterns and uncover spatial trends.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	Practical 6 – Basic Spatial Analysis	Uploaded Reading Linked Videos	Assignment post
11		Principles of Cartography	- Appraise different map products on their effectiveness of data and geographic story communication. - Produce well-designed and informative cartographic products.	Synchronous Discussion Collaborative practical using online geospatial application	Practical 7 – Creating Cartographic Products	Uploaded Reading	Assignment post
12		Applications and Uses of Geographic Information Systems	- Evaluate the suitability of different data sources and techniques for applied problems.	Asynchronous Discussion Thread PPT with voice narration. Online geospatial technology application.	VLE Discussion post and peer responses.	Uploaded Reading Linked Videos	Discussion Forum
13		Role of GST in 21 st Century Geography	- Describe the applications of GIS as related to research and governance.	Synchronous Discussion Collaborative reading exercise	Article Review	Uploaded Reading	Assignment post
14	Unit 3: GST in Research and Education	Creating GST products for Educational Practice	- Design geospatial products and experiences to enhance student interdisciplinary geographic learning.	Asynchronous Discussion Thread, practical product sharing PPT with voice narration.	Practical 8 – Teaching with geospatial technologies	Uploaded Reading Linked Videos	Assignment post
15		Module Evaluation	- Reflect critically on course growth and future application	Synchronous Discussion	VLE Assignment:		Student Surveys

		Celebration of Learning	of material	Reflective practice activity	Student Feedback Questionnaire		
Exams					Geospatial Inquiry Project Reports		

Overview of the overall Assessment

Assessment approaches	Weightings
A. Geospatial Inquiry Project	30%
B. Practical Exercises and E-Portfolio	40%
C. Weekly VLE Assignments and participation	10%
E. Semester End Examination	20%

Assessment Approaches

Geospatial Inquiry Project: The aim of this assignment is to give students an opportunity to apply their skills of geospatial technology use and analysis with authentic data derived from partnership with Bhutanese agencies and organizations. Students will complete a practical (lab-based) inquiry project grounded in geospatial data after the mid semester. Guided by the Inquiry cycle, students will identify a project of personal interest derived from the topics explored in the module. Students will acquire geospatial data (or generate it as necessary), **apply** skills of data manipulation and visualization, and perform basic remote sensing and/or spatial analysis and interpretation to answer their inquiry project question. Students will Demonstrate **self-knowledge**, reflecting on the meaning of learning when in collaboration with community partners

Practical Exercises and E-Portfolio: This series of practical exercises is designed to provide students with the opportunity to connect the theory of this course to authentic practice. Through completion of these practicals, students will build an E-Portfolio of geospatial products that can be used as resources for their future geography teaching. Students will complete this series of practical experiences to learn how geospatial technologies can be used to map, describe, and analyse patterns of natural and human geography. These practicals will be structured to provide application of the content covered within the teaching units.

Weekly VLE Assignments: Each week of online teaching will incorporate a short and engaging VLE activity. These activities are meant to promote discussion on content and provide opportunity for self-exploration and reflection. Some planned activities include writing short Educator Reflections on a given prompt and participating in discussion posts and peer responses. Instructions for each activity will be clearly stated on the VLE page. Completion of these tasks will be used in place of formal timed attendance.

Semester End Examination: Students take a written examination at the end of the semester requiring them to **explain** concepts, principles, and processes covered within this course. Additional focus will be placed on the **application** of course knowledge and skills to hypothetical scenarios (identifying appropriate remote sensing platforms and techniques, describing appropriate GIS workflows and spatial analysis routines).

Reading Lists Essential Reading

- Anji, R., M. (2016). *Textbook of remote sensing and GIS*. Hyderabad: BS Publications.
- Balram, S., & Boxall, J. (Eds.). (2019). *GIScience teaching and learning perspectives*. New York: Springer.
- Burrough, P.A., & McDonnell, R. A. (2013). *Principles of Geographic Information Systems*. New York: Oxford University Press.
- Committee on the Support for the Thinking Spatially, Committee on Geography, & National Research Council. (2006). *Learning to think spatially: GIS as a support system in the K-12 curriculum*. National Academies Press.
- Lillesand, T., Keifer, R. W., & Chipman, J. (2015). *Remote sensing and image interpretation*. New York: John Wiley and Sons.
- Muñiz Solari, O., Demirci, A., & Schee, J. (Eds.). (2015). *Geospatial technologies and geography education in a changing world*. Spring. <https://doi.org/10.1007/978-4-431-55519-3>

Additional Reading

- Baker, T. R., Battersby, S., Bednarz, S. W., Bodzin, A. M., Kolvoord, B., Moore, S., ... Uttal, D. H. (2015). A research agenda for geospatial technologies and learning. *Journal of Geography*, 114(3), 118–130. doi.org/10.1080/00221341.2014.950684
- Bednarz, S. W. (2004). Geographic Information Systems: A tool to support geography and environmental education? *GeoJournal*, 60(2), 191-199.
- Bodzin, A. M., & Anastasio, D. (2006). Using web-based GIS for earth and environmental systems education. *Journal of Geoscience Education*, 54(3), 295-300.
- Church, R. L., & Murray, A. T. (2009). *Business site selection, location analysis, and GIS*. Hoboken, NJ: John Wiley & Sons.
- Crampton, J. W. (2011). *Mapping: A critical introduction to cartography and GIS* (Vol.11). New York: John Wiley & Sons.
- Goodchild, M. F. (2009). Geographic information systems and science: today and tomorrow. *Procedia Earth and Planetary Science*, 1(1), 1037-1043.
- Jensen, J. R. (2007). *Remote sensing of the environment: An earth resource perspective*. Singapore: Pearson Education (Singapore) Ptc. Ltd. SK products.
- LeGates, R. T. (2005). *Think globally, act regionally: GIS and data visualization for social science and public policy research*. Redlands, CA: Esri Press.
- Machiwal, D., Mishra, A., Jha, M. K., Sharma, A., & Sisodia, S. S. (2012). Modeling short term spatial and temporal variability of groundwater level using Geostatistics and GIS. *Natural resources research*, 21(1), 117-136.
- Mohan, A., & Mohan, L. (2013). *Spatial thinking about maps: Development of concepts and skills across the early school years* (p. 46). National Geographic Education Programs.
- Moorman, L. (2019). The evolution and definition of geospatial literacy. In *GIScience teaching and learning perspectives* (pp. 9–36). New York, NY: Springer Science+Business Media, LLC.
- National Research Council, & Geographical Sciences Committee. (2005). *Learning to think spatially*. National Academies Press.
- Nayak S., & Zaltanova, S. (Eds) (2008). *Remote sensing and GIS technologies for monitoring and prediction of disasters*. Springer Science & Business Media.
- Mitchell, A. (2001). *ESRI guide to GIS analysis*. ESRI Press. USA: Red Lands.
- Solimini, D. (2016). *Understanding earth observation: The electromagnetic foundation of remote sensing* (Remote Sensing and Digital Image Processing) (1st ed). New York: Springer.