

Course Description:

Upon successful completion of the course, the student will be able to the fundamental theory of Geographic Information Systems (GIS) & Remote Sensing the GIS tools to conduct hazard analysis and risk assessment hazard & risk maps that are fit-for-purpose and effectively convey the information they are intended to.

Course Outline:

1. Geographical Information System (GIS)

- Fundamental theory of Geographic Information Science
- Concepts of spatial database and types (its acquisition and development.
- Concept of four M's (Mapping, Modeling, Management & Monitoring) in GIS.
- Spatial Data handling for disaster management.

2. Remote Sensing (RS)

- History, Scope and Concept of Remote Sensing
- Elements of Remote Sensing
- Concepts of Image resolution, swath width, cycle and limitations.
- Remote Sensing data for hazard forecasting and monitoring.

3. Application of GIS and RS in Disaster Management

- Hazard Mapping & Risk Assessment
- Role of GIS and RS in Mitigation and Preparedness
- Role of GIS and RS in Disaster Response and Recovery
- Role of GIS and RS in Disaster Risk Assessment
 - Preparation of different thematic maps; exercises on creating maps for different disasters

4. Practical and Lab Work

- Geo-referencing
- Creation of feature class
- Data input and processing
- data Mosaicking
- Thematic Maps and their cartographic representation
- Data handling and out put
- Use of remotely sensed data
- Image processing and extraction of features and information
- Uses and application of raster and vector data in Disaster Management
- Hazard, vulnerability and risk mapping

5. Teaching Methodology

- Lectures
- Written Assignments
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Assessment Criteria:

1st Term (25%) Assignments/Quizzes and Presentations

Mid Term (35%) Written (Long Questions, Short Questions, MCQs)

Final Term (40%) Written (Long Questions, Short Questions, MCQs)

Textbooks:

1. Campbell, J. B., Wynne, R. H., & Thomas, V. A. (2022). *Introduction to Remote Sensing*. Guilford Publications
2. Bolstad, P., Manson, S. (2022). *GIS Fundamentals: A First Text on Geographic Information Systems*. United States: Elder Press.
3. Gorr, W. L., Kurland, K. S. (2020). *GIS Tutorial for ArcGIS Desktop 10.8*. United States: Esri Press.
4. Nigam, A. (2023). *Basics of Remote Sensing and GIS*. Academic Guru Publishing House.
5. Palanichamy, A., Gogana, V., Behera, R. R., & Pandey, A. K. (2023). *Fundamentals of Geographic Information System and Remote Sensing*. AG Publishing House.
6. Law, M., Collins, A. (2022). *Getting to Know ArcGIS Desktop 10.8*. United States: Esri Press.
7. Bakker, W. H., Meer, F. D. V. D., Feringa, W., Parodi, G. N., Gieske, A. S. M., Pohl, C., Gorte, B. G. H., Reeves, C. V., Grabmaier, K. A., Ruitenbeek, F. J., Hecker, C. A., Schetselaar, E. M., Horn, J. A., Tempfli, K., Huurneman, G. C., Weir, M. J. C., Janssen, L. L. F., Westinga, E., Kerle, N., & Woldai, T. (2009). *Principles of Remote Sensing: An Introductory Textbook*. Netherlands: ITC.
8. Price, M. H. (2023). *Mastering ArcGIS Pro*. United States: McGraw Hill LLC.
9. Chang, K. T. (2019). *Introduction to Geographic Information Systems*. McGraw Hill LLC. Libgen.lc
10. Chang, K. T. (2010), "Introduction to Geographical Information Systems" Higher Education, McGraw-Hill
11. Clarke, K. (2010), "Getting started with Geographic Information System", 5th Edition, Prentice Hall, New York. ISBN –10: 0131494988
12. Huisman, O. and de By, R. A. (2009), "Principles of Geographic Information Systems: An Introductory Textbook", ITC Educational Textbook Series; 1, ISBN 978-90-6164-269-5
13. Gopi, S., Sathikumar, R., & Madhu, N. (2007). *Advance Surveying Total Station, GIS and Remote Sensing*. New Delhi, India: Dorling Kindersley.
14. Campbell, James B. (2011). *Introduction to Remote Sensing*, 5th Ed. The Guilford Press.
15. Foody, G.M. & Curran, P.J. (1994). *Environmental Remote Sensing from Regional to Global scales*. John, Wiley & Sons. Inc. 250 p
16. Gibson, P. J (2000). *Introductory Remote Sensing: Principles and Concepts* Rutledge

