CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF GEOLOGY
M.Sc. GEOLOGY

Course Code	EGE 5303	Semester	III
Course Title	Geospatial Technology and Engineering Geology		
Credits	3	Type	Core

This is a participatory, experimental, problem solving and entrepreneurship based skill development course for Geotechnical skills, Geospatial software skills and exploration skills.

Course Description

This course will discuss the fundamentals of geospatial technology and engineering geology. Geospatial technology is an applied branch of earth science which deals with the modern tools contributing to the geographic mapping and analysis of the Earth and human societies. Engineering Geology is the branch of geology which describes the application of geology in engineering studies.

Course Outcome

By the end of the course, students are expected to be able to:

- understand the basics of geospatial technology and engineering geology.
- have an introduction towards remote sensing and GIS .
- have an idea about the applications of remote sensing and GIS.
- understand various geotechnical investigations and interpretations.

Course Structure

Module - 1

Geospatial Technology-Concept, Software and Hardware, Data. Map-Map projections-Map Scale, Datum. Space mission and satellites. Global Positioning System: Basic features, NAVSTAR GPS, GLONASS, IRNASS. Remote sensing- Basic concept, Electromagnetic Energy. Energy sources and radiation principles. Energy interactions in the atmosphere, energy interaction with earth surface features, Spectral Reflectance. Remote Sensing Platforms. Photogrammetry: basic principles – geometric characteristics of aerial photographs. Aerial photo interpretation. Thermal Remote Sensing and Microwave Remote Sensing. Digital image processing. Geographic Information System-Fundamentals of GIS and Components of GIS. Data and database management system
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Module – 2

Applications of remote sensing in Geology, land use-land cover mapping-NDVI,Natural resource management, Water resources management; Disaster management and Environmental management. Applications of GIS in Geology, Water Resource Management,Environmental Impact Analysis, Urban planning, Disaster Management and Mitigation, Natural Resources Management.

Module – 3

Physical and engineering properties of rocks. Rock deformation and mechanical properties. Principal geological factors affecting engineering projects – Earth movements, stability of slopes and cuttings, groundwater, volcanoes, earthquakes; Geological materials used in construction. Geological considerations in engineering projects and site selection such as dams, reservoirs bridges, highways and tunnels. Geological investigation of engineering projects. Landslide hazard zonation mapping. Aseismic design of buildings and earthquake-resistant structures. Influence of geological conditions on foundation and design of buildings. Seismic zonation.

Evaluation &Grading

Skill development (Analytical, Writing and Presentation) – 20%
Class Test – 20%

***End Semester Assessment* – 60%**

References

- Campbell, J. B.and Wynne, R. H. (2008), Introduction to Remote Sensing, Fifth Edition, The Guilford Press, New York, 718p.
- Falkner, E. and Morgan D. (2002), Aerial Mapping: Methods and Applications, Lewis Publishers, Boca Raton, 192p.
- Lillesand, T.M., Kiefer,R.W. and Chipman, J.W. (2004), Remote sensing and image interpretation, Fifth Edition, Wiley, NJ, 812p.
- Mather, P.M. and Koch, M. (2011),Computer Processing of Remotely-Sensed Images – An Introduction, Fourth Edition, John Wiley, New York, 462p.
- McCoy, R. M. (2005), Field methods in remote sensing, Guilford Press, New York, 177p.
- DeMers, M. N. (2009), GIS for dummies, Wiley, NJ, 388p.
- Iliffe, J. (2000), Datums and Map Projections for remote sensing, GIS, and surveying, Whittles Publishing, Scotland, 159p.
- Konecny, G. (2003), Geoinformation: Remote sensing, photogrammetry and geographic information systems, Taylor& Francis, London, 266p.
- Shekar, S., Xiong, H. eds. (2008), Encyclopaedia of GIS, Springer-Verlag, New York, 1392p.
- Sickle, J. V. (2010), Basic GIS Coordinates, CRC Press, FL, 190p.
- Verbyla, D. L. (2003), Practical GIS analysis, Taylor & Francis, London, 305p.
- Jensen, J.R., (2000). Remote Sensing of the Environment an Earth Resource Perspective. New Jersey: Prentice Hall, Inc, 608p.
- Jensen, J.R., (2005). Introductory Digital Image Processing: A Remote Sensing Perspective. 3rd ed. Upper Saddle River, NJ: Pearson Prentice Hall, 544p.
- G.L. Prost (2002). Remote sensing for Geologists: A guide to image interpretations. CRC Press, 326p.
- Floyd F. Sabins (1997) Remote Sensing: Principles and interpretations.WH Freeman & Company, 494p.
- P. A. Burrough, Mcdonnell R A (1998). Principles of geographical information systems. Oxford university press, 332p.
- Arogyaswamy, R.N.P (2017). Courses in Mining Geology. Oxford and IBH Publishers, 735p.
- Hartman H. L. and Mutmansky, J.M. (2002). Introductory mining Engineering, John Wiley and Sons Inc.
- Gaudin, A .M. (1938) Principles of Mineral Dressing, McGraw Hill, 554p.
- Petters, W.C. (1987) Exploration and Mining Geology. John Wiley, 706p.
- Reedman, J.H. (1979) Techniques in mineral exploration, Allied Scientific Publishers, 534p.
- Bell, F.G. (1983) Fundamentals of Engineering Geology. Butterworth-Heinemann, 656p.
- Coduto, D.P. (2001) Geotechnical Engineering –Principles and Practices. Prentice Hall of India, Pvt Ltd, New Delhi.
- Duggal, S.K. Pandey, H.K. and Rawal, N. (2014) Engineering Geology, McGraw Hill Education (India) Pvt. Ltd.
- Lee. F. and Griffiths (2007). Engineering Geomorphology, Whittles publishing, 288p.
- Krynine, D.P. and Judd, W.R. (2001) Principles of engineering geology and Geotectonics, CBS Publishers and Distributers, New Delhi.