BASIC GEOINFORMATION SCIENCE

ENGE 101

Lecture : 2 **Year : I**
Tutorial : 0 **Part : I**
Practical : 0

Course Objectives:
This course covers fundamental concepts, principles, scope and applications of geomatics engineering approaches surveying, photogrammetry, remote sensing, geographic information system and global navigation satellite system. Students will have the scope of geomatics engineering for applications in their related fields such as natural resource management, environment, civil engineering, agriculture, forestry, information system will be discussed. Students also acquire knowledge and skills in map making and interpretation, and basic techniques of spatial data acquisition used in geomatics engineering.

1 Introduction and Overview of Geoinformation Science (4 hours)

1.1 History and definition of Geoinformation science
1.2 Introduction on geomatics engineering features and functions
1.3 Importance in geomatics engineering
1.4 Application in geomatics engineering
1.5 History of computer science, data and information, spatial and nonspatial information, expert system, geography, ontology and the geomatics expert

2 Photogrammetry and Remote Sensing (5 hours)

2.1 History of photogrammetry
2.2 Concept of photogrammetry and its scope
2.3 Photogrammetry and its importance in geomatics engineering
2.4 Application of photogrammetry
2.5 Definition, history and application of remote sensing, hands on visual image interpretation exercise

3 Surveying and Map Making (5 hours)

3.1 History of surveying and fundamentals of surveying concepts and its application
3.2 Elements of cartography, history of cartography
3.3 Cartography projection in the world, technology and cartography
3.4 Numerical and digital cartography, application of cartographic and hands on map reading exercise

4 History and Development of Cadastral System (7 hours)

4.1 Overview of cadastral system in Nepal
4.2 Overview of cadastral system in SAARC and developed countries
4.3 Hands on cadastral map reading exercise

5 Geographic Information System (GIS) and GNSS (4 hours)

5.1 Basic concept of GIS
5.2 Data input and data quality; Major data feeds to GIS and their characteristics; Maps, GPS, images, databases; Commercial data, GIS mapping
5.3 GNSS, its importance and applications; Practice on GNSS data collection

6 Future Trends and Emerging Technologies (5 hours)

6.1 Advanced topics in geoinformatics
6.2 Big data, machine learning and artificial intelligence; Integration with emerging technologies
6.3 Sensor networks, and block-chain; Career opportunities in geoinformatics
6.4 Industry trends, certifications and professional development

Reference

1. Daniel T. Gillins, Michael L. Dennis, Allan Y. Ng (Eds.). (2022). Surveying and geomatics engineering: Principles, technologies, and applications (ASCE Manuals and Reports on Engineering Practice No. MOP 152). Reston, VA: American Society of Civil Engineers.
2. Gomarasca, M. A. (2010). Basics of geomatics (English trans.). Dordrecht, NL: Springer.
3. Ogaja, C. (2016). Geomatics engineering: A practical guide to project design. Boca Raton, FL: CRC Press.
4. Acharya, B. (2020). Geoinformatics. Pokhara, Nepal: Center for Space Science and Geomatics Studies, Institute of Engineering (Pashchimanchal Campus).
5. Campbell, J. E., Shin, M. (2012). Geographic information system basics (Creative Commons licensed). Retrieved from https://2012books.lardbucket.org/books/geographic-information-system-basics