1. **MAPPING AND REMOTE SENSING**

Credit hours: 3 (2+1)

Prerequisites: None

**Specific Objectives**

To impart skills and techniques for mapping and use of emerging technologies like Remote Sensing (RS) and Global Position System (GPS)for planning

**Learning Outcomes**

After studying this course, the learners will be able to:

1. Define and describe various type of maps, remote sensing and global positioning system.
2. Understand the basic principles, elements and types of mapping, photogrammetry and remote sensing
3. Apply various types of map for urban and regional planning.
4. Apply remote sensing and mapping techniques for the preparation of thematic maps to be used for spatial development planning.
5. Apply the knowledge of mapping and remote sensing in their professions and daily life experiences.
6. Compile map and build model byusing General Topographical Sheet RS and GPS for pointsdata, arc and polygon data on map.

**Content List**

* Basic concepts in the field of Cartography and its use in Planning
* Essentials of mapping: Co-ordinate system, Plane Spherical; Rectangular, Latitude and Longitude; Scales: Representative Fraction(RF), graphic and area scale; scale of factor determination and change of map scale.
* Map types with respect to scale and usesuch as Survey of Pakistan (SOP) General Topographical Sheet and revenue department cadastral Maps.
* Content and presentation techniques; Map Symbols.
* Thematic maps.
* Photogrammetry: Characteristics of Aerial Photographs Interpretation of Mosaics.
* Introduction to Remote Sensing (RS)and Global Positioning System(GPS):Definition and History, Physical Basis; Spatial, temporal and spectral aspects; Sensor Systems (Space and airborne); Platforms (Types and Orbital Characteristics); Thermal Infrared; Introduction to Microwave (Importance and applications); Digital Image Processing (Over view of computer based image processing).

**Practical**

* Assignments on graphic scales

Map compilation; Scale enlargement and reduction.

* Study and interpretation of topographic sheets; Cadastral Maps (*Massavies and*, *Khasra* plans etc.).
* Image interpretation, False color composite, Visual Interpretation of satellite images and aerial photographs.
* Various sensors data comparison; Thermal Infrared Image interpretation.
* Introduction to image processing software e.g. ERDAS Imagine (display, Geo-linking, Zooming, Identification of targets etc.).
* Use of GPS in the field to locate points, polygons or lines.

**Proposed Teaching Methodology**

* Lecturing
* Demonstration
* Use of related software

**Proposed Assessment (theory, 100%)**

**Mid Term (40%)**

* Written long/short questions, quizzes etc

**Final Term (60%)**

* Written long/short questions, quizzes etc

**Proposed Assessment (practical, 100%)**

* Presentations, assignments, report writing, viva voce, field visits etc

**Recommended Books**

1. Xian, George (2016), *Remote Sensing Applications for the Urban Environment*, CRC Press.
2. Gretchen, N.P. (2014), *GIS Cartography: A Guide to Effective Map Design, CRC* Press; ISBN-13: 978-148222067
3. [Elliott D. K.](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&text=Elliott+D.+Kaplan&search-alias=books&field-author=Elliott+D.+Kaplan&sort=relevancerank) (2006), *Understanding GPS: Principles and Applications*, Artech house, ISBN-10: 1-5 8053-894-0
4. Lillesand, T. M. and Kiefer, R. W. (2004),*Remote Sensing and Image Interpretation*, John Wiley and Sons, ISBN 0-471-15227-7
5. Mather, P. M. (2004),*Computer Processing of Remotely Sensed Images*,John Wiley and Sons, ISBN 0-470-84919-3
6. Campbell, J. B. (2002),*Introduction to Remote Sensing*, The Guilford Press, ISBN 0-7484-0663-8 (pbk).
7. Gibson, P. J. (2000),*Introductory Remote Sensing: Principles and Concepts*, Routledge, ISBN 0-415-19646-9.
8. Robinson, H., *Elements of Cartography*, John Wiley & Sons, New York, (Latest Edition)