

Coursework for PhD Remote Sensing and GIS

(Under Course Credit Semester System)

No. of Theory Paper-4

No. of Practical paper-1

1st

Semester:

Course No.		Credit Hours
MRG. 611 (Theory Compulsory)	-Principles of Remote Sensing & GIS	4CH
MRG. 612 (Theory Elective)	-Developments in Remote Sensing and GIS	4CH
MRG 613	-Research Methodology	4CH
MRG 614	-Practical	4CH
MRG 615	-Review and Writing Research Papers	4CH

Syllabus for PhD in Remote Sensing and GIS

1st Semester

Course- MRG 611 (Theory Compulsory) Principles of Remote Sensing & GIS 4CH

Objectives: In these units, the students can know the characteristic properties of EMR, principles of remote sensing and fundamental concepts of remote sensing data.

Expected outcome After the study, the student will have the knowledge of exploring the knowledge by remote sensing methods. The students can know the requirement of knowledge of remote sensing in various field areas.

Unit-1

Definition of Remote Sensing; History and development of RS; Benefits of RS over conventional method of resource survey. Components of Remote Sensing System.

Electromagnetic Radiation (EMR), Nature and generation of EMR; Effects of atmosphere on EMR and its interaction with rocks minerals vegetation, water, soil etc.

Unit- II

Platform, Role of platform in Remote Sensing, Types of platform with their specific uses. Fundamental properties of sensors and their functions. Basic features of different types of sensors in use

Unit-III

RS data products. Principles of RS data analysis and their applications. Fundamentals of Geographic information system. Components of GIS.

Unit- IV

Classification schemes in GIS. Training site selection; supervised classification. Geographic information system, Data structure of GIS, Raster and vector data for geographical entities.

Unit-V

Application of RS and GIS in Geology and Geography.
Application of RS and GIS in Environmental Science and Town planning.

Books Recommended

1. Lillesand M. Thomas and Ralph W. Kiefer, (2007) Remote Sensing and Image Interpretation, 6th revised edition, John Wiley & Sons, New York, page no. 1-768.
2. Jensen R. John (2013) Remote Sensing of the Environment, 2nd edition An Earth Resource Perspective, Pearson India Pvt. Ltd., Delhi, page no: 1-618.
3. M. Anji Reddy (2004) Geoinformatics for Environmental Management, B.S Publications, Hyderabad,
4. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, page no. 1- 456
5. LO. C.P., and Albert K. W. Yeung, (2006) Concepts and Techniques of Geographic Information Systems, 2nd edition, Prentice-Hall of India, New Delhi, page no: 1-544.
6. Peter A. Burrough and Rachael A. Mc. Donnell, (2015) Principles of Geographical Information System, Oxford University Press Inc., New York, page no: 1-352.

Course- MRG.612 (Theory Elective) Developments in Remote Sensing and GIS 4CH

Objectives: Satellite data for resources assessment and analysis have taken centre stage in Geological science due to its properties of multiplicity. Space information in geology is very important to find out changes in any dynamic environment. In this paper they are elaborated regarding any one development areas of remote sensing data in a very smooth manner.

Expected outcome: After the study, the students will have the knowledge of the application of remote sensing and GIS for solving various problems in their core area.

Developments in Remote Sensing and GIS- 1. (Thermal & Microwave Remote Sensing)

Unit-I

Thermal Remote Sensing principles. Thermal sensors.
Thermal Remote Sensing data and their interpretation.

Unit-II

Microwave remote sensing principles. Microwave sensors
Microwave remote sensing data and their interpretation.

Unit- III

Characteristic features of digital images. Image analysis and pattern recognition.
Image enhancement reduction and magnification, contrast enhancement.

Unit-IV

Rationing. Spatial filtering, Edge enhancement.
Special transformation. Thematic information extraction.

Unit-V

Application of Thermal remote sensing data.
Application of Microwave remote sensing data.

Books Recommended

1. Lillesand M. Thomas and Ralph W. Kiefer (2008) Remote Sensing and Image Interpretation, John Wiley & Sons, New York, page no:1-768.
2. Arthur H. Robinson (2002) Elements of Cartography, John Wiley & Sons, New York, page no.1-251
3. Dennis P. Curtin, Kim Foley, Kunal Sen & Cathleen Morin (1999), Information Technology - The Breaking Wave, Tata McGraw Hill Ed.page no.1-250
4. M. Anji Reddy (2004), Geoinformatics for Environmental Management, BS Publications, Hyderabad, page no
5. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, pageno 1-452

2.Developments in Remote Sensing and GIS-B(Geographical Information system and Global Positioning System)

MRG 612

Unit-I

Nature of geographic data. Data collection and entry for GIS, Data structure of GIS, data integration, Projection and registration.

Map projection. Thematic maps. Map symbolization.

Unit-II

Concept of Vector and raster data.

Spatial data modelling.

Unit-III

Training site selection; supervised classification. Unsupervised classification.

Unit-IV

Fundamentals of GPS. Different GPS systems.

GPS survey principles.

Unit-V

Digital elevation modelling.

Application of DEM.

Books Recommended for Paper

1. Lillesand M. Thomas and Ralph W. Kiefer, (2007) Remote Sensing and Image Interpretation, 6th revised edition, John Wiley & Sons, New York, page no. 1-768.
2. Jensen R. John (2013) Remote Sensing of the Environment, 2nd edition An Earth Resource Perspective, Pearson India Pvt. Ltd., Delhi, page no: 1-618.
3. M. Anji Reddy (2004) Geoinformatics for Environmental Management, B.S Publications, Hyderabad,
4. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, page no. 1- 456
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6. Peter A. Burrough and Rachael A. Mc. Donnell, (2015) Principles of Geographical Information System, Oxford University Press Inc., New York, page no: 1-352.

Course- MRG.613 Research Methodology

4CH

Objectives: In these units, the students will study various techniques of statistical methods, which will be useful in solving geological problems. They are also getting a scope to go through the knowledge of computer methods that will be useful in carrying out research activities.

Expected outcome: After the study, the students will have the confidence to apply the science of statistics and computer in their research area so that they can overcome the cumbersome areas of analysis and, reach the destination in an easy manner.

Qualitative Analysis and Computer Application

Unit- I

Application of statistical concepts/ procedures, Data, Diagrammatic representation of data, Probability, Measures of central tendency, Measures of dispersion, Skewness and Kurtosis, Normal distribution, Simple correlation, multiple correlation, regression analysis, Sampling, Simple random sampling, Systematic sampling .

Unit- II

Testing of hypothesis tests, X² (Chi-square), t and F-test; Analysis of variance, covariance; Principal component analysis, Experimental design, completely randomized block design, randomized block design, Latin square design. One-way analysis of variance, two-way analysis of variance, Follow-up tests; Non-parametric procedures; Writing of Research report.

Unit- III

Windows and or Linux operating system; Programming fundamentals; Basics of high level Programming language- C, Editing, Compilation and running a programme, storing data; Elementary numerical methods. Plotting graph; preparing paper? Report using latex.

Unit- IV

Learning software packages specific to Applied Geology. ERDAS- for image processing; 21st Century GIS and ARC GIS.

Course- MRG. 614 Practical and/ or Field study 4CH

Objectives: Practical related to papers 611 and 612 are conducted so that the theory can be applicable in a practical manner.

Course- MRG. 615 Review and Writing Research Papers 4CH

Objectives : In this paper, the students are given the training of “how to design and develop research literature” which is a part of every research thesis.

Expected outcome: The students will be in a position to identify their areas of research basing on their knowledge of collected literature. They will be in a position to identify the techniques of adopting various methodologies to reach their goal.