Courses offered to Other Departments

SYLLABUS

(Revised Syllabus w.e.f the academic year 2021-22
under the CBCS)

CENTRE FOR GEOINFORMATICS
The Gandhigram Rural Institute (Deemed to be University)
(Ministry of Education, Govt. of India)
Accredited by NAAC with 'A' Grade (3rd Cycle)
Gandhigram – 624 302
Dindigul District, Tamil Nadu

Courses offered to Other Departments

Code	Title	Programme
21GISI0901	Geoinformatics for Development Administration	MA DA
21GISP0401	Geoinformatics for Rural Development	MA RD

Elective – Generic - UG

Code	Title
21GISU04G1	Introduction to Geoinformatics
21GISU04G2	Geoinformatics for Agriculture
21GISU04G3	Geoinformatics for Water resource Management

Elective – Generic - PG

Code	Title
21GISP02G1	Basics of Geoinformatics
21GISP02G2	Geoinformatics for Disaster Management

Value Added Course

Code	Title
21GISP2VA1	Advanced Surveying
21GISP2VA2	Planetary Remote Sensing
21GISP2VA3	Satellite Meteorology
21GISP2VA4	Land Use/ Land Cover Mapping using Google Earth Engine

M.A. Development and Administration

Semester	IX	Course Code	21GISI0901
Course Title	**Geoinformatics for Development Administration (Practical)**		
No. of Credits	4	No. of contact hours per Week	4
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	70%
Category	• Major course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The Course aims to • introduce Geoinformatics as an advanced tool consisting for development and administration		

UNIT	**Content**	**No. of Hours**
I	Remote Sensing: Definition - components of remote sensing. DIP: Definition – Stages in DIP: Image Geometric Correction – Image Enhancement – Image Classification. GNSS: Definition – segments of GNSS – uses of GNSS.	12
II	Image layerstack – training site creation – signature editing – image classification.	12
III	Geographic Information System (GIS): Definition - Components - contributing disciplines – spatial data – attribute data. Introduction to ArcGIS – Map Georeferencing – GCS – PCS – creation of geodatabase – spatial data entry - attribute data entry – joining spatial and attribute data – field calculation – mapping	12
IV	Application - I: Property Tax Mapping – Land Administration – Natural Hazard Assessment and integrated development planning.	12
V	Application - II: Village GIS – Local government: land-use planning – road and utility management – crime analysis – property management – infrastructure assessment and development.	12

References	***Text Books*** 1. Chandra A.M., Geoinformatics, New Age International Publishers, New Delhi, 2016.
	Reference Books 1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System (3rd Edition), Pearson Education Pvt. Ltd., New Delhi, 2017. 2. Peter A. Burrough et al., Principles of Geographical Information System (3rd Edition), Oxford University Press Inc., New York, 2015. 3. Michael N.Demers, Fundamentals of Geographic Information Systems (4th Edition), Wiley India Pvt.Ltd, New Delhi, 2013. 4. Lillesand, Kiefer and Chipman, Remote Sensing and Image Interpretation (6th Edition), Wiley India Pvt.Ltd, New Delhi, 2017. 5. Hofmann – Wellenhof, Lichtenegger and Collins, GPS: Theory and Practice (5th edition), Springer Wien, New York, 2015.
	E-Resources 1. Paul A. Longley & Michael F. Goodchild & David J. Maguire & David W. Rhind, Geographic Information Systems and Science, 2005, https://www.pdfdrive.com/geographic-information-systems-and-science-e158960719.html. 2. DeMers & Michael N, Fundamentals of geographic information systems, 2016, https://www.pdfdrive.com/fundamentals-of-geographic-information-systems-e158092208.html 3. Gottfried, Konecny, Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, 2014, https://www.pdfdrive.com/geoinformation-remote-sensing-photogrammetry-and-geographic-information-systems-e188376098.html. 4. https://www.esri.com/en-us/industries/urban-community-planning/ overview?rsource=https%3A%2F%2Fwww.esri.com%2Fen-us%2Findustries%2Fstate-local-government%2Fsolutions%2 Fcommunity-development.
Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the concept of Digital Image Processing, GIS and GNSS. CO2 Execute digital image processing techniques. CO3 Execute the tools of GIS. CO4 Apply the tools of Geoinformatics in Administrative planning. CO5 Apply the tools of Geoinformatics in Utility studies.

Programme Specific Outcomes (PSO)

1. **PO 1:** In depth knowledge in Political Science and Development Administration.
2. **PO 2:** Analytical ability in fields of Political Science and Development Administration.
3. **PO 3:** Skills required for employment in Academic, government corporate and development Sectors.
4. **PO 4:** Ability to deal with issues challenges opportunities in their professions and occupations.
5. **PO 5:** Capacity to appear in various competitive examinations particularly Civil service examination of UPSC and examinations of TNPSC.

Mapping of COs with PSOs:

CO	PSO				
	1	**2**	**3**	**4**	**5**
CO 1	1	1	2	3	1
CO 2	1	1	3	3	1
CO 3	1	1	3	3	1
CO 4	2	2	3	3	1
CO 5	2	1	1	3	1

M.A. Rural Development

Semester	IV	Course Code	21GISP0401
Course Title	**Geoinformatics for Rural Development**		
No. of Credits	2	No. of contact hours per Week	2
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	40%
Category	• Modular Course		
Scope of the Course	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • introduce Geoinformatics technologies in rural development		

UNIT	**Content**	**No. of Hours**
I	Definition - Meaning – Scope - Concept of Spatial Technologies - Contributing Technologies – Earth - Projection – Spatial objects.	4
II	Remote Sensing: Definition – components of remote sensing. Digital Image Processing: Definition – Stages in DIP: Image Correction – Image Enhancement – Image Classification.	5
III	Geographic Information System (GIS): Definition – components – contributing disciplines. Tools of GIS: Buffer – Overlay – Interpolation - Reclassification	5
IV	GPS: Definition – Segments of GPS – use of GPS – GNSS: NAVSTAR, GLONASS, GALILEO– RNSS: IRNSS – QZSS.	5
V	Areas of Applications of Geoinformatics: Village GIS – Natural Resource Management – Disaster Management – Navigation - Agriculture.	5

References

Text Books

1. Chandra A.M., Geoinformatics, New Age International Publishers, New Delhi, 2016.

Reference Books

1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System (3rd Edition), Pearson Education Pvt. Ltd., New Delhi, 2017.
2. Peter A. Burrough et al., Principles of Geographical Information System (3rd Edition), Oxford University Press Inc., New York, 2015.
3. Michael N.Demers, Fundamentals of Geographic Information Systems (4th Edition), Wiley India Pvt.Ltd, New Delhi, 2013.
4. Lillesand, Kiefer and Chipman, Remote Sensing and Image Interpretation (6th Edition), Wiley India Pvt.Ltd, New Delhi, 2017.

	5. Hofmann – Wellenhof, Lichtenegger and Collins, GPS: Theory and Practice (5th edition), Springer Wien, New York, 2015.
	E-Resources 1. Paul A. Longley & Michael F. Goodchild & David J. Maguire & David W. Rhind, Geographic Information Systems and Science, 2005, https://www.pdfdrive.com/geographic-information-systems-and-science-e158960719.html. 2. DeMers & Michael N, Fundamentals of geographic information systems, 2016, https://www.pdfdrive.com/fundamentals-of-geographic-information-systems-e158092208.html 3. Gottfried, Konecny, Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, 2014, https://www.pdfdrive.com/geoinformation-remote-sensing-photogrammetry-and-geographic-information-systems-e188376098.html. 4. https://www.esri.com/en-us/industries/urban-community-plannin g/overvie w?rsource=https%3A%2F%2Fwww.esri.com%2Fen-us%2F industries%2Fstate-local-government%2Fsolutions%2Fcommunity-development
Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the concept of Spatial Technologies CO2 Understanding the fundamentals of Remote Sensing & execute digital image processing techniques. CO3 Execute the tools of GIS. CO4 Understand the concept of GPS. CO5 Apply the tools of Geoinformatics in development, various applications and administration.

Elective – Generic – UG

Semester	IV	Course Code	**21GISU04G1**
Course Title	**Introduction to Geoinformatics**		
No. of Credits	3	No. of contact hours per Week	3
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Non-Major Elective		
Scope of the Course	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • introduce the technologies of Geoinformatics • create an outline on Remote sensing and Digital Image Processing • teach the concept of GIS and GPS • discuss about the various areas of application of Geoinformatics		

UNIT	**Content**	**No. of Hours**
I	Definition - Meaning – Contributing technologies of Geoinformatics. Remote Sensing: Definition – Components – EMR - Remote Sensing Resolutions – Optical – Thermal and Microwave.	8
II	Digital Image Processing – Stages – Image Preprocessing, Image Enhancement and Image Classification.	10
III	GIS: Definition - Components of GIS – Data used in GIS – data structures - Analytical Tools of GIS: Buffer – overlay – reclass – Spatial Interpolation.	10
IV	Definition – Segments of GPS – Global: NAVSTAR – GLONASS - GALILEO; Regional: IRNSS – QZSS.	10
V	Natural Resources Management - Disasters Mapping and Management – Environmental Studies – Military – Civil Engineering – Agriculture - Location Based Services.	10

References

Text Books

1. Chandra A.M., Geoinformatics, New Age International Publishers, New Delhi, 2016.

Reference Books

1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System (3rd Edition), Pearson Education Pvt. Ltd., New Delhi, 2017.
2. Peter A. Burrough et al., Principles of Geographical Information System (3rd Edition), Oxford University Press Inc., New York, 2015.
3. Michael N.Demers, Fundamentals of Geographic Information Systems (4th Edition), Wiley India Pvt.Ltd, New Delhi, 2013.
4. Lillesand, Kiefer and Chipman, Remote Sensing and Image Interpretation (6th Edition), Wiley India Pvt.Ltd, New Delhi, 2017.
5. Hofmann – Wellenhof, Lichtenegger and Collins, GPS: Theory and Practice (5th edition), Springer Wien, New York, 2015.

	E-Resources 1. Paul A. Longley & Michael F. Goodchild & David J. Maguire & David W. Rhind, Geographic Information Systems and Science, 2005, https://www.pdfdrive.com/geographic-information-systems-and-science-e158960719.html. 2. DeMers & Michael N, Fundamentals of geographic information systems, 2016, https://www.pdfdrive.com/fundamentals-of-geographic-information-systems-e158092208.html 3. Gottfried, Konecny, Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, 2014, https://www.pdfdrive.com/geoinformation-remote-sensing-photogrammetry-and-geographic-information-systems-e188376098.html.
Course Outcomes	On completion of the course, students should be able to do, CO1 Discuss the technologies of Geoinformatics. CO2 Explain the concept of Remote Sensing and Digital Image Processing. CO3 Analyze the concept of Geographical Information System. CO4 Analyze the concept of GPS. CO5 Apply the tools of Geoinformatics in various fields.

Semester	IV	Course Code	**21GISU04G2**
Course Title	**Geoinformatics for Agriculture**		
No. of Credits	3	No. of contact hours per Week	3
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Non-Major Elective		
Scope of the Course	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • introduce the technologies of Geoinformatics • create an outline on Remote sensing and Digital Image Processing. • teach the concept of GIS and GPS. • discuss about the various areas of application of Geoinformatics.		

UNIT	**Content**	**No. of Hours**
I	Geoinformatics: Definition - Meaning –Concept of Geoinformatics - Contributing Technologies: Remote sensing – Digital Image Processing – GIS – GNSS.	8
II	Crop inventory and remote sensing: Introduction – leaf optical properties – identification of crops and crop inventorying – crop acreage estimation – vegetation indices – yield estimation.	10
III	Remote sensing for soil: Introduction – soil genesis and soil classification – soil taxonomy – soil reflectance properties – soil mapping using remote sensing – soil erosion estimation and sedimentation.	10
IV	Land Evaluation and management: Introduction – land use/ land cover classification – change dynamics – land capability assessments.	10
V	Damage assessment: Introduction – crop loss assessment by floods – flood hazard zone mapping – drought management – reflectance properties of stressed crops.	10

References

Text Books

1. Francis J. Pierce, David Clay, GIS Applications in Agriculture, CRC Press, 2007

Reference Books

1. Dr. Graciela Metternicht, Dr. Alfred Zinck, Remote Sensing of Soil Salinization: Impact on Land Management, CRC Press, 2008.
2. Janis L. Boettinger, David W. Howell, Amanda C. Moore, Alfred E. Hartemink, Suzann Kienast-Brown, Digital Soil Mapping: Bridging Research, Environmental Application, and Operation, Springer Science &

	Business Media, 2010
	E-Resources 1. Remote Sensing Handbook: Volume 2 - Land Resources Monitoring, Modeling, and Mapping, https://www.pdfdrive.com/remote-sensing-handbook-volume-2-land-resources-monitoring-modeling-and-mapping-with-remote-sensing-e157908108.html 2. Satellite Remote Sensing and GIS Applications in Agricultural Meteorology, https://www.pdfdrive.com/satellite-remote-sensing-and-gis-applications-in-agricultural-meteorology-e40010463.html 3. GIS Applications in Agriculture, Volume Four: Conservation Planning , https://www.pdfdrive.com/gis-applications-in-agriculture-volume-four-conservation-planning-e26616670.html
Course Outcomes	On completion of the course, students should be able to do, CO1 Discuss the technologies of Geoinformatics. CO2 Explain the concept of crop inventory. CO3 Apply remote sensing technology in soil. CO4 Use Geoinformatics technologies in land evaluation and management. CO5 Apply the concept in damage assessment.

Semester	IV	Course Code	**21GISU04G3**
Course Title	**Geoinformatics for Water Resource Management**		
No. of Credits	3	No. of contact hours per Week	3
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Non-Major Elective		
Scope of the Course	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • introduce the technologies of Geoinformatics and their areas of application in water resource management		

UNIT	**Content**	**No. of Hours**
I	Geoinformatics: Definition - Meaning –Concept of Geoinformatics - Contributing Technologies: Remote sensing – Digital Image Processing – GIS – GNSS.	8
II	Watershed Management: Watershed characterization, delineation and codification, watershed problems and management strategy, Geoinformatics approach for watershed prioritization. Remote Sensing in Surface – Subsurface Water Exploration: Application of remote sensing in hydro-geomorphological interpretation for ground water exploration, water quality monitoring through remote sensing.	10
III	Water Conservation Projects: Geoinformatics based site selection for river valley projects, surface water harvesting structures: check dam, Nala bunds, subsurface dykes etc.	10
IV	Operational Applications in Water Resources: Flood prediction, drought evaluation, snow cover mapping, reservoir sedimentation evaluation.	10
V	Geoinformatics Models in Water Resources: Geoinformatics based Runoff and hydrological modeling, flood Hazards' modeling, snowmelt runoff modeling.	10

References

Text Books

1. John G. Lyon, GIS for Water Resource and Watershed Management, CRC Press, 2003

Reference Books

1. John G. Lyon**,** Geographic Information Systems in Water Resources Engineering, CRC Press, 2009.

E-Resources

1. Geographic Information Systems in Water Resources Engineering, https://www.pdfdrive.com/geographic-information-systems-in-water-resources-engineering-e190107317.html
2. Integrating GIS, Remote Sensing, and Mathematical Modelling for

	Surface Water Quality Management, https://www.pdfdrive.com /integrating-gis-remote-sensing-and-mathematical-modelling-for-surface-water-quality-management-in-irrigated-watersheds-unesco-ihe-phd-the sis-e165584308.html 3. GIS and Geocomputation for Water Resource Science and Engineering, https://www.pdfdrive.com/gis-and-geocomputation-for-water-resource-science-and-engineering-e158241847.html
Course Outcomes	On completion of the course, students should be able to do, CO1 Discuss the technologies of Geoinformatics. CO2 Apply the technology in surface and sub-surface water resource management. CO3 Uses Geoinformatics in conservation projects. CO4 Apply the tools of Geoinformatics in water resources. CO5 Create models for water resources.

Elective – Generic - PG

Semester	II	Course Code	**21GISP02G1**
Course Title	**Basics of Geoinformatics**		
No. of Credits	3	No. of contact hours per Week	3
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Non-Major Elective		
Scope of the Course	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • Provide an introduction to various technologies of Geoinformatics and its applications.		

UNIT	**Content**	**No. of Hours**
I	Definition - Meaning – Scope – Technologies of Geoinformatics - Contributing Technologies. Remote Sensing: Definition – Components – EMR - Remote Sensing Resolutions – Types of Remote Sensing - Types of Satellites –Image Interpretation -	8
II	Digital Image Processing: Definition, Stages in Image Processing, Image Preprocessing, Image enhancement – Image Classification.	10
III	Definition - Components of GIS – types of data – sources of spatial/attribute data - Geodatabase - Analytical Tools of GIS: Buffer – Overlay – Query - Spatial interpolation - Surface analysis - network analysis.	10
IV	Definition - Working Principles – Segments - Advantages – Disadvantages of GNSS – Global: NAVSTAR, GLONASS, GALILEO; Regional – IRNSS, QZSS; Augmentation – WAAS, LAAS - Stand alone Vs DGPS.	10
V	Natural Resources Management - Environmental Studies - Disaster Management - Urban Studies - Military Applications – Navigation - Location Based Services – Civil Engineering - Agriculture.	10

References

Text Books

1. Chandra A.M., Geoinformatics, New Age International Publishers, New Delhi, 2016.

Reference Books

1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System (3rd Edition), Pearson Education Pvt. Ltd., New Delhi, 2017.
2. Peter A. Burrough et al., Principles of Geographical Information System (3rd Edition), Oxford University Press Inc., New York, 2015.
3. Michael N.Demers, Fundamentals of Geographic Information Systems (4th Edition), Wiley India Pvt. Ltd., New Delhi, 2013.

	4. Lillesand, Kiefer and Chipman, Remote Sensing and Image Interpretation (6th Edition), Wiley India Pvt. Ltd., New Delhi, 2017. 5. Hofmann – Wellenhof, Lichtenegger and Collins, GPS: Theory and Practice (5th edition), Springer Wien, New York, 2015
	E-Resources 1. Paul A. Longley & Michael F. Goodchild & David J. Maguire & David W. Rhind, Geographic Information Systems and Science, 2005, https://www.pdfdrive.com/geographic-information-systems-and-science-e158960719.html. 2. DeMers & Michael N, Fundamentals of geographic information systems, 2016, https://www.pdfdrive.com/fundamentals-of-geographic-information-systems-e158092208.html**.** 3. Gottfried, Konecny, Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, 2014,https://www.pdfdrive.com/geoinformation-remote-sensing-photogra mmetry-and-geographic-information-systems-e188376098.html**.**
Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the technologies of Geoinformatics. CO2 Introduce the concept of Remote Sensing and Digital Image Processing. CO3 Learn the concept of Geographical Information System. CO4 Known Global Navigation Satellite System. CO5 Apply tools of Geoinformatics in various fields.

Semester	II	Course Code	**21GISP02G2**
Course Title	**Geoinformatics for Disaster Management**		
No. of Credits	3	No. of contact hours per Week	3
New Course /Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Non-Major Elective		
Scope of the Course	• Basic Skill / Advanced Skill • Skill Development • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze)		
Course Objectives	The Course aims to • Introduce technologies of Geoinformatics in disaster management		

UNIT	**Content**	**No. of Hours**
I	Nature, characteristics and types of Disasters – Causes and effects of Disaster – Disaster Profile of India – Disaster Management cycle.	8
II	Disaster Management; Earthquakes: Causes and effects – measurements - earthquake zones of the world and India – vulnerability and microzonation; Volcanoes: Causes and effects – volcanic zones of the world and in India - volcanic hazards; Landslides: Causes and effects – landslide prone zones in India – GIS case studies for earthquake, volcano and landslide.	10
III	Drought : Types – factors influencing drought – variable identification – vegetation index – land use / ground water level changes – soil erosion –delimiting drought prone areas – short term and long term effects; Desertification :Processes – over utilization of water and land resources – GIS based management strategies – GIS case studies for drought and desertification.	10
IV	Cyclone: Origin and types - effects on land and sea – damage assessment; Flooding: Topography, land use and flooding – Space-time integration – GIS based parameters and layers – flood prone area analysis and management – risk assessment – GIS case studies for cyclones and floods.	10
V	Atmospheric Disasters: Ozone layer depletion – green house / global warming –acid rain – snow melt – sea level rise – related problems; Nuclear, Chemical /Industrial and Mining Disasters: Types – consequences – major disasters of the world and India; Marine Disasters: Oil spill and chemical pollution – coastal zone management strategies – GIS case studies.	10

References	***Text Books*** 1. R. Subramanian, Disaster Management, Vikas Publishing House, 2005.
	Reference Books 1. National Disaster Management Division (2004) Disaster Management in India - A Status Report, Ministry of Home Affairs, Government of India, New Delhi. 2. Matthews , J.A., (2002) Natural Hazards and Environmental Change, Bill McGuire, Ian Mason. 3. Skeil, A (2002) Environmental Modeling with GIS and Remote sensing, John Wiley and sons, New York. 4. Singh, R.B (Ed.) (1996) Disasters, Environment and Development, Oxford & IBH, New Delhi. 5. Barrett E.C., and L. F. Curtis, (1992) Introduction to Environmental Remote Sensing, Chapman and Hall, London. 6. UNDRO (1995) Guidelines for Hazard Evaluation Procedures, United Nations Disasters Relief Organization, Vienna. 7. Nagarajan, R., (2004) Landslide Disaster Assessment and Monitoring, Anmol Publications, NewDelhi.
	E-Resources 1. Asian Development Bank, Disaster Management: A Disaster Manager's Handbook – Asian, Disaster Management: A Disaster Manager's Handbook – Asian. 2. Bhandari, Disaster Education and Management: A Joyride for Students, Teachers and Disaster, https://www.pdfdrive.com/disaster-education-and-management-a-joyride-for-students-teachers-and-disaster-managers-e157698367.html
Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the concept of disaster. CO2 Explain different types of disasters. CO3 Apply the various ways to prevent and prepare for disaster. CO4 Understand the methods of emergency preparedness. CO5 Apply the concept of Geoinformatics in disaster management.

Value Added Courses

Semester	II	**Course Code**	21GISP2VA1
Course Title	**Advanced Surveying**		
No. of Credits	2	No. of contact hours per Week	2
New Course / Revised Course	New Course	If revised, Percentage of Revision effected	-
Category	• Value added course		
Scope of the Course	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives	The Course aims to • Introduces the advance tool of surveying viz., total station, DGPS, UAV		

UNIT	**Content**	**No. of Hours**
I	Introduction to Total Station: Principle and Function. REM, RDM, Use of Total station for data processing and analysis.	6
II	Introduction to Differential GPS (DGPS): Principle and Function. Duel and Single Frequency DGPS, RTK and Static Surveys in DGPS, Use of DGPS in Topographical Survey. Comparison of total station with DGPS in Topographical Surveying	6
III	Introduction to Unmanned Aerial Systems (UAS), UAV (Unmanned Aerial Vehicle): Principle and Functions, Drone survey.	6
IV	Total station Survey and data processing. Area selection, setup of instrument at base station and collecting points using reflector.	6
V	DGPS setting of Instruments at base and rover. DGPS Survey and Data Processing. Generation of digital elevation model (DEM)	6

References

Text Books

1. Sathees Gopi et al., Advanced Surveying: Total Station, GPS, and Remote Sensing (2nd Edition), Pearson India Education Services Pvt. Ltd., Noida, 2019.

Reference Books

1. Hofmann – Wellenh of, Lichtenegger and Collins, GPS: Theory and Practice (5th Edition), Springer Wien, New York, 2015.
2. Alfred Et al., GPS Satellite Surveying (4th Edition), Wiley India Pvt. Ltd., New Delhi, 2018.
3. Michael Kennedy, 'The Global Positioning System and GIS: An Introduction', Taylor and Francis Inc. New York, 2002.
4. Satheesh Gopi, Global Positioning System Principles and Applications.
5. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005.

E-Resources

1. http://www.maps-gps-info.com/ed-resources.html
2. http://www.gisdevelopment.net/tutorials/tuman004.htm
3. http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html

Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the concept about total station. CO2 Understand the concept of DGPS and its working principle. CO3 Understand the technology of UAV. CO4 Process the data derived from total station. CO5 Process DGPS surveying and its data.

Mapping of COs with PSOs :

CO	**PSO**				
	1	**2**	**3**	**4**	**5**
CO 1	2	2	2	1	1
CO 2	2	2	1	2	2
CO 3	2	2	2	1	1
CO 4	3	3	3	2	2
CO5	2	3	2	2	3

Semester	II	**Course Code**	21GISP2VA2
Course Title	**Planetary Remote Sensing**		
No. of Credits	2	No. of contact hours per Week	2
New Course / Revised Course	New Course	If revised, Percentage of Revision effected	-
Category	• Value added course		
Scope of the Course	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives	The Course aims to • introduce the technology of remote sensing in planetary science.		

UNIT	**Content**	**No. of Hours**
I	Universe and Solar System: Origin of Universe - Big Bang and Steady state theories, Solar System - planets, satellites asteroids, meteorites and comets and internal differentiation of the planets.	6
II	Terrestrial Planets: Geology and geophysics of terrestrial planets: earth, mars, venus and mercury; physical properties, composition, mineralogy and petrology of the planets and the Moon.	6
III	Planetary Atmosphere: Exo- and Endogenic processes associated with origin and internal evolution of planets – planetary volcanism, craters, elemental composition; mineralogy and petrology; thermal, seismic and magnetic properties.	6
IV	Remote Sensing for Planetary Geology: Approaches to Remote Sensing analysis of the planetary surfaces; applications derived from interaction of electromagnetic radiation (X-ray, gamma-ray, visible, near-IR, mid-IR, radar).	6
V	Planetary Exploration Missions: Past, present and future missions - Analyses and Interpretation of data gathered through various missions: identification of morphological features.	6

References

Text Books

1. Bo Wu, Kaichang Di, Jürgen Oberst, Irina Karachevtseva**,** Planetary Remote Sensing and Mapping, CRC Press, 2018

Reference Books

1. Shuanggen Jin , Planetary Geodesy and Remote Sensing, CRC Press, 2015

E-Resources

1. Introduction to Planetary Geomorphology, https://www.pdfdrive.com /introduction -to-planetary-geomorphology-e166013877.html
2. Planetary Remote Sensing and Mapping, https://www.pdfdrive.com/ planetary-remote-sensing-and-mapping-e190135569.html.

Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the basic information about to universe and solar system. CO2 Understand the concept of terrestrial planets. CO3 Understand the planetary atmosphere. CO4 Apply remote sensing for planetary geology. CO5 Apply remote sensing in planetary exploration missions.

Mapping of COs with PSOs :

CO	**PSO**				
	1	**2**	**3**	**4**	**5**
CO 1	2	2	3	1	1
CO 2	2	2	1	2	2
CO 3	2	2	2	1	1
CO 4	3	3	1	2	2
CO5	2	3	2	1	3

Semester	II	Course Code	21GISP2VA3
Course Title	**Satellite Meteorology**		
No. of Credits	3	No. of contact hours per Week	3
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected	20%
Category	• Value added course		
Scope of the Course	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • introduce the technologies of remote sensing in meteorology		

UNIT	**Content**	**No. of Hours**
I	Basics – Concepts in Satellite Meteorology – Conventional Direct Measurements – Indirect Methods and Remote Sensing.	6
II	Weather Satellites and Sensing Systems – Orbit Types and Altitudes – View Angle and Implications – INSAT and KALPANA – TRMM and GPM and others – American and European Missions, availability of data and derived data sets.	6
III	Data Records and Applications – Active and Passive Sensor Data – Microwave Sensors and Applications – Altitude. Wind. Temperature and Wave Measurements and Sensors – AWS Global Network in Measurements.	6
IV	Meteorological Applications – Oceanographic Applications – Weather Forecasting – Aviation Meteorology – Agriculture and Irrigation Management – Meteorology in Transportation Industry – Business and Trade Application.	6
V	Management and Monitoring : Satellite Meteorology in Welfare Management – Cyclone Warning Systems – World Precipitation and Warming – Sea level Monitoring – Ice and Snow – Flood and Storm Surge Warning Systems – Storms – Wild Fires and Volcanic Ash.	6

References

Text Books

1. R R Kelkar, Satellite Meteorology, 2nd Edition, BS Publications,2017

Reference Book

1. Text book on Satellite Meteorology, https://metnet.imd.gov.in/imdetp/lecture_notes/course10/LN_10_55_Lecture%20on%20Satellite%20Meteorology.pdf

E.Resources

1. Remote Sensing Applications with Meteorological Satellites, https://cimss.ssec.wisc.edu/rss/brienza/source/AppMetSat12.pdf
2. Satellite Meteorology, http://iprc.soest.hawaii.edu/users/yqwang/EOLSS satellite.pdf

Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the basic concept of satellite meteorology. CO2 Understand different types of weather satellites and sensors CO3 Understand data records and applications. CO4 Apply satellite data in different fields. CO5 Apply the technology in management and monitoring.

Mapping of COs with PSOs :

CO	**PSO**				
	1	**2**	**3**	**4**	**5**
CO 1	2	1	2	3	1
CO 2	2	2	1	2	2
CO 3	2	2	2	1	1
CO 4	3	1	1	2	2
CO5	2	3	2	1	3

Semester	II	Course Code	21GISP2VA4
Course Title	**Land Use/ Land Cover Mapping using Google Earth Engine**		
No. of Credits	2	No. of contact hours per Week	2
New Course / Revised Course	New Course	If revised, Percentage of Revision effected	-
Category	• Value added course		
Scope of the	• Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate) • K-6: (Create)		
Course Objectives	The Course aims to • exposes the students to know about Earth engine and its applications.		

UNIT	**Content**	**No. of Hours**
I	Introduction to Earth Engine - Explore Earth Engine - Sign Up with Earth engine. JavaScript code Editior - JavaScript Syntax - Code Editor	6
II	Unsupervised Classification - Clustering - Training Reference Data Supervised Classification with Landsat - Processing Landsat Data - Classification with Landsat - Confusion Matrix	6
III	Supervised classification with Sentinel - Processing Sentinel Data - Classification with sentinel - Confusion matrix Supervised Classification with MODIS - Processing MODIS Data - Classification with MODIS - Confusion Matrix	6
IV	Change Detection Analysis - Water Change Analysis - Forest Change Analysis - Assignment: Water Change Analysis	6
V	Global Land Cover Products - Globe Cover - NLCD Land Cover. - Case Study.	6

References

Text Books

1. Google Earth Engine Applications, Lalit Kumar and Onisimo Mutanga, MDPI publications.

Reference Books

1. Programming Google App Engine with Java, Sanderson, Dan, O'Reilly Media, Year: 2015
2. Programming Google App Engine with Python: Build and Run Scalable Python Apps on Google's Infrastructure, Dan Sanderson O'Reilly Media, Year: 2015

E-Resources

1. https://earthengine.google.com/

Course Outcomes	On completion of the course, students should be able to do, CO1 Understand the concept Earth Engine and Java Script. CO2 Learn about Unsupervised classification.
	CO3 Learn about Supervised classification. CO4 Understand Change Detection analysis. CO5 Understand Global Land Cover and Analysis case study.

Mapping of COs with PSOs :

CO	**PSO**				
	1	**2**	**3**	**4**	**5**
CO 1	2	1	3	1	1
CO 2	2	2	3	2	2
CO 3	2	2	2	1	1
CO 4	3	1	3	2	1
CO5	1	3	2	2	3