Semester- III (B) MDC

Geoinformatics Project Planning and Disaster Management			
Course Code	**MCGI311**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	45 Hours of teaching + 5sessions of SDA	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- To familiarize them how to select particular project with plan, quality with cost and time.
- To develop skills to hand project in organization.
- To enable the students to formulate, execute and manage Geoinformatics projects.
- Geospatial technology use for mapping, impact assessment, forewarning, preparedness and mitigation of adverse effects.

Module-1

Introduction: Definition of plan, project, program and scheme. Functions of planning and management. Components of Geoinformatics project. Types of projects.

GIS Project Planning: Project phases and Project lifecycle, project stake holders, system development life cycle, GIS software evaluation and selection, Hardware considerations and acquisition, Techno-economic feasibility analysis, project formulation, product and project design, Project proposals.

Module-2

Project Costs and Appraisal: Elements of cost, costing techniques, resources planning cost components of a geo-informatics project-Manpower, Hardware and software costs, and Maintenance cost, organizational cost, service charges, outsourcing cost, Cost budgeting. Project appraisal Methods -Discounting and non-discounting techniques, net present value. Benefit Cost Ratio, Break Even Point Analysis, Cost and Return simulation, Return on Investment.

Project Time, Quality and Cost Management: Project scheduling-Network analysis, PERT and CPM techniques, Gant chart, Time and Cost crashing. Project cost and time control, feedback mechanisms, quality control / quality assurance. Data standards, ISO standards.

Module-3

Planning A Geo-informatics Project: Types of Geo-informatics projects, Health, Census, Market GIS, GIS Strategic Plan, Needs Assessment and Requirements Analysis, Organizational Involvement, Evaluating Existing Data, Accuracy, Completeness. Software and hardware Selection, Technical Environment, Assessing Costs and Benefits.

Project Scope and Risk Management: Project scope definition, scope verification, scope change control, risk management planning, project risk identification, quantitative and qualitative risk analysis, risk response planning, risk monitoring and control.

Module-4

Case Studies/Successful Projects: Project Planning and Disaster management , K- GIS, National Agricultural Drought Assessment and Monitoring System (NADAMS), Reward (Sujala –III), etc. GIS Organizations, Management Issues in GIS, Trends in GIS.

Module-5

Disaster Preparedness: Geo-informatics in crisis management, multi-hazard risk assessment and early warning systems, risk communication including through citizen science and crowd sourcing, The role of GIS and SDI as an integrated framework in emergency response and multi-agency coordination, Local preparedness, Relief management-Shelter, Sustainable recovery through build back better, Damage and Loss Assessment, climate change adaptation and disaster risk reduction, International Space Charter for Disasters and Sentinel Asia.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

11. Two Unit Tests each of **25 Marks**
12. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

26. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
27. The question paper will have ten full questions carrying equal marks.
28. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
29. Each full question will have a sub-question covering all the topics under a module.
30. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. A Guide to the Project Management Body of Knowledge(PMBOK Guide)Project Management Institute PM I6th edition 2017.
2. Project Estimating and Cost Management (Project Management Essential Library) by ParvizF.Rad2001
3. Data Analytics for Engineering and Construction Project Risk Management BYIvan Damnjanovic, Kenneth Reinschmidt Springer International Publishing 2020.
4. Proceedings of International Conference on Remote Sensing for Disaster Management by Peddada Jagadeeswara Rao, Kakani Nageswara Rao, Sumiko Kubo Springer International Publishing 1st edition2019

Web links and Video Lectures (e-Resources):

- https://1lib.in/book/3574775/66d182?dsource=recommend
- https://1lib.in/book/5243197/3b23f7?dsource=recommend

Skill Development Activities Suggested

- To develop project with cost and time.
- To develop the skills to organising the different projects.
- To do projects on disaster management

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	To understand different phases of geoinformatics projects and planning needs.	I,II
CO2	To understand different phases of geoinformatics projects and planning needs.	II,III
CO3	To apply GIS technology on corporate, health, business sector, Understand project scope and risk analysis.	III,IV
CO4	To develop organisational structure and how to motivate the employee and resolve the conflict.	IV,V
CO5	To Create recent spatial database for mobile GIS and emergency and disaster preparedness	V,VI

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								**X**				
CO2		**X**										
CO3		**X**			**X**	**X**						
CO4					**X**	**X**			**X**		**X**	
CO5		**X**				**X**	**X**				**X**	**X**

Semester- III (B) (MDC)

Unmanned Aerial System (UAS) and Applications			
Course Code	**MCGI312**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	45 Hours of teaching + 5sessions of SDA	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- To impart basics of UAS, rules regulating their operations.
- To familiarise them with data acquisition, processing and analysis.
- To develop applications in various sectors.

Module-1

Introduction: History of Drone/UAS/UAVs, classification of UAV platform, advantages, payload, battery life, system specifications, Regulations for flying drones and DGCA licensing policy, Flight planning, Flight execution (pre, during and post), characteristics of smart UAV.

Module-2

Surveying with UAVs: Components of drone survey, large scale project survey, i-base establishment, data acquisition, Consideration for remote sensing payloads, main hardware components, comparison on Total station, GPS and UAV surveying and its accuracy, Techniques of controlling errors, Consideration of GCPs in vertical and horizontal accuracies, Autonomous flight vs. manual and hybrid flight profiles.

Module-3

Image processing and Photogrammetry: UAV-based image processing, influencing factors of imaging, Image alignment-Aerial Triangulation, Block adjustment, structure from motion (sfm) photogrammetry, post processing software, point cloud evaluation, drone-based LiDAR technology, DEM, DSM, Contouring; Cut, Fill and Volumetric measurement calculation; orthophoto generation.

Module-4
Modeling and analysis of UAV data: Concept of modeling, tools in UAV modeling, evaluation of output, Understanding RTK, PPK and GCPs, Overview of popular data processing software platforms and functions. Image interpretations and analysis.
Module-5
Applications of UAV data: Application of drone for Surveying, Mapping, Construction, Agricultural, Engineering Land Survey and Architecture, crop insurance, disaster management, etc.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

13. Two Unit Tests each of **25 Marks**
14. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

31. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
32. The question paper will have ten full questions carrying equal marks.
33. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
34. Each full question will have a sub-question covering all the topics under a module.
35. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Theory, design, and applications of unmanned aerial vehicles by A. R. Jha Ph.D CRC Press / Taylor & Francis Group 2016.
- UAV or Drones for Remote Sensing Applications, Volume 1 by Felipe Gonzalez Toro, Antonios Tsourdos volume1 2018
- Unmanned Aerial Vehicle: Applications in Agriculture and Environment by Ram Avtar, Teiji Watanabe Springer 2019
- Drone Technology in Architecture, Engineering, and Construction: A Strategic Guide to Unmanned Aerial Vehicle Operation and Implementation by Daniel Tal, Jon Altschuld Wiley 2021

Web links and Video Lectures (e-Resources):

- https://1lib.in/book/11728318/96c900?dsource=recommend

Skill Development Activities Suggested

- To develop the UAS system and fly in the field.
- To analyse the drone images in different software.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand UAV technology in image capturing. Illustrate flight planning within flying regulations.	I, II
CO2	Develop a plan for large scale survey integrated with Total station and GPS, hardware components and compare different flight profiles.	II, III
CO3	Image processing and Block adjustment. Analyse the products such as DSM, Orthophoto, etc.	III, IV
CO4	To develop different types of models compare RTK, PPK and GCP in model frames, evaluate different software and image interpretation.	IV, V
CO5	Design UAV application in different fields and show it as an essential GIS tool.	V, VI

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**X**							**X**				
CO2						**X**	**X**					
CO3							**X**					
CO4									**X**		**X**	
CO5											**X**	**X**

Semester- III (B) (MDC)

Geoinformatics in Marine and Coastal Resources Management			
Course Code	MCGI313	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:1	SEE Marks	50
Total Hours of Pedagogy	45 Hours of teaching + 5sessions of SDA	Total Marks	100
Credits	3	Exam Hours	03

Course Learning objectives:

i. The student would be able to use RS/GIS in various modeling tools in understanding the Earth's oceans, the ocean resources and their management.

ii. They have been exposed to geo-informatics applications to oceanography, marine and coastal environment.

iii. To learn the Applications on Coastal Resource Management

Module-1

Introduction: Types of marine and coastal resources, properties of sea water, thermocline and pycnocline, air-sea interactions, Upwelling and Down welling, El Nino-Sothern Oscillation (ENSO) phenomena. Role of oceans in the climate system. Generic spatial data- processing tasks: Sensor calibration, Atmospheric correction, Positional registration, Geophysical product derivation, etc.

Module-2

Oceanographic Studies: Interdisciplinary nature of oceanography, ocean processes, platforms and sensors for oceanography, spectral bands for study of ocean parameters, Mesoscale ocean features (Eddies, Fornts, other phenomena), Physical and Biological oceanography applications of geoinformatics, large ocean phenomena with human impact.

Module-3

Coastal Engineering Applications: The Coast- beaches and shoreline processes, Coastal erosion and protection, Hydrodynamics of pollution dispersion, Modelling of suspend sediment. Coastal Bathymetry; Coastal Geomorphology, Coastal habitat (Mangrove, Coral reefs, wet lands etc).

Module-4

Coastal Zone Applications: Introduction – Major issues/problem – coastal wetland classification – thematic maps on coastal resources- site suitability analysis for aquaculture – Coastal Regulation zone – Coastal aquifer modelling using GIS-Integrated coastal Zone Management–conflict analysis –Resources association.

Module-5

Meteorology and Climate Applications: Estimation of weather and climate parameters, and modelling aspects, global climatology. Rainfall mapping, potential and actual Evapo-transpiration, Hydrometeorology: atmospheric water content, cloud mapping, rain forecasting, artificial rain, cyclone forecasting, Using satellite data for climate monitoring.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

15. Two Unit Tests each of **25 Marks**
16. Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

36. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
37. The question paper will have ten full questions carrying equal marks.
38. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
39. Each full question will have a sub-question covering all the topics under a module.
40. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. Measuring the Oceans from space by Ian. S Rabinson Springer 2004
2. Discovering the Oceans from Space (Vol-1,Vol-2) by Ian.S Rabinson springer2010
3. Essentials of Oceanography by Alan P Trujillo and Harold V Thurman by10th edition2012
4. Satellite Meteorology by R R Kelkar B S publications Second edition 2017
5. GIS for Coastal Zone Management by Darius Bartlett and Jennifer Smith C R C Press2000

Web links and Video Lectures (e-Resources):

- https://1lib.in/book/3574775/66d182?dsource=recommend

Skill Development Activities Suggested

- To learn skills in applications of Ocean and metrological.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	To understand concepts of marine resources and Ocean phenomenon.	I,II
CO2	To acquire knowledge about processing of ocean and applications of Physical and Biological oceanography.	II, III
CO3	To get knowledge on modelling on Coastal engineering application.	III,IV
CO4	To Develop database for applications of coastal zone management.	IV,V
CO5	To create models and mapping the applications of Meteorology	V,VI

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					**X**						
CO2				**X**	**X**						
CO3				**X**							**X**
CO4							**X**				
CO5		**X**					**X**				