KANNUR UNIVERSITY

(Abstract)

Post Graduate Diploma in Geoinformatics for Spatial Planning in the Dept of Geography, SAT Campus, Payyanur - Regulation, Scheme & Syllabus Approved & Implemented w.e.f 2023 admission - Orders issued

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ACADEMIC C SECTION

ACAD A/ACAD C3/467/2023 Dated: 29.09.2023

Read:-1. GO (Ms) No 528/2022/HEDN dated 22/10/2022

2. Letter No Acad C3/20143/2022 dated 26/11/2022
3. Letter of even number dated 18/01/2023
4. UO Number ACAD/ACAD C3/365/2023 dated 22/06/2023
5. Email dated 26/06/2023 from the Head, Dept of Geography, SAT Campus, Payyanur
6. Minutes of the meeting of the Department Council dated 05/06/2023
7. Letter of even number dated 08/09/2023
8. Email dated 18/09/2023 from the Head, Dept of Geography
9. Minutes of the meeting of the Department Council dated 18/09/2023.

ORDER

1. As per paper read (1) above, Govt sanctioned Administrative Sanction for starting Project Mode Programme Diploma Course in Geoinformatics for Spatial Planning during the Academic Year 2022-'23.

2. As per paper read (2) above, HoD, Dept of Geography was requested to submit the draft Regulation & Syllabus for the aforementioned Programme along with a panel of five-member Expert Committee.

3. As per paper read (3) above, draft Regulation & Syllabus submitted by the HoD was forwarded to five Experts for scrutiny.

4. Meanwhile, as per paper read (4) above, nomenclature of the Programme is changed from Diploma Course in Geoinformatics for Spatial Planning to Post Graduate Diploma in Geoinformatics for Spatial Planning.

5. As per paper read (5) above, Head , Dept of Geography submitted the draft Regulation, Scheme & Syllabus of Post Graduate Diploma in Geoinformatics for Spatial Planning programme incorporating the suggestions of the Expert Committee. Department Council in its meeting held on 05/06/2023 vide paper read (6) above approved the aforesaid syllabus.

6. The Vice Chancellor, approved the Regulation, Scheme & Syllabus of Post Graduate Diploma in Geoinformatics for Spatial Planning with certain changes.

7. As the approved Regulation is silent about the conduct of Examination, criteria of Evaluation etc, Head, Dept of Geography, vide paper read (7) above was requested to incorporate these details in the Regulation part of the aforementioned syllabus

8. As per paper read (8) above, the Head, Dept of Geography submitted the final Regulation, Scheme & Syllabus of PG Diploma in Geoinformatics for Spatial Planning Programme incorporating details on examination and evaluation along with the Department Council Minutes (paper read (9) above) approving these modifications .

9. The Vice Chancellor, after considering the matter in detail and in exercise of the powers of the

Academic Council conferred under section 11(1), Chapter III of Kannur University Act 1996, ***approved the Regulation, Scheme & Syllabus of Post Graduate Diploma in Geoinformatics for Spatial Planning Programme subject to report to the Academic Council and accorded sanction to implement in the Department of Geography, SAT Campus, Payyanur w.e.f 2023 admission.***

10. Regulation, Scheme & Syllabus of Post Graduate Diploma in Geoinformatics for Spatial Planning Programme, implemented with effect from 2023 admission, is appended and uploaded in the University website (www.kannuruniversity.ac.in)

11. Orders are issued accordingly.

Sd/-
Sajesh Kottambrath
Assistant Registrar1
For REGISTRAR

To: Head, Dept of Geography, SAT Campus, Payyanur

Copy To: 1. To Exam Branch (through PA to CE)
2. PS to VC/ PA to PVC/ PA to R
3. EP IV / EXCI
4. SWC
5. DR/ AR I /AR II (Acad)
6. To Webmanager (to publish in the website)
7. Computer Programmer
8. SF/DF/FC

Forwarded / By Order
SECTION OFFICER

KANNUR UNIVERSITY
CIVIL STATION P.O.
KANNUR
Pin-670 002
THAVAKKARA

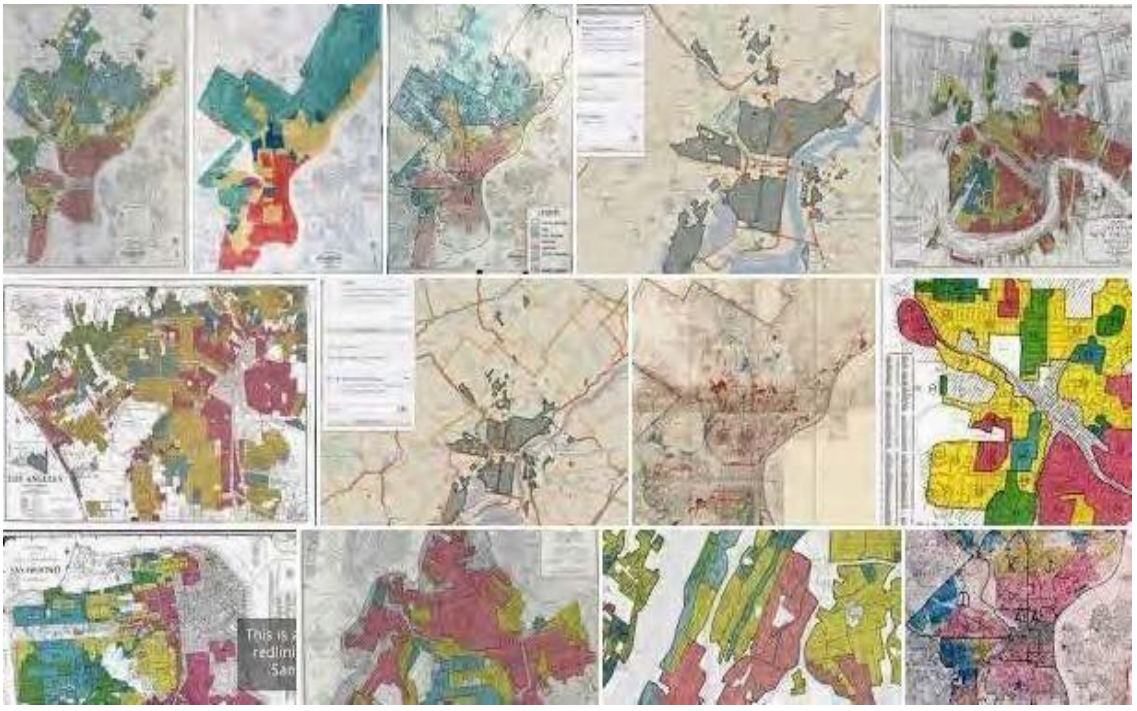
KANNUR UNIVERSITY

REGULATION AND SYLLABUS

FOR POST GRADUATE

DIPLOMA IN

GEOINFORMATICS FOR SPATIAL PLANNING



DEPARTMENT OF GEOGRAPHY

SWAMI ANANDATHEERTHA CAMPUS PAYYANUR

2023 Admission onwards

1. INTRODUCTION

The **Post Graduate Diploma**in ***Geoinformatics for Spatial Planning*** aims to provide in-depth understanding of application of Remote Sensing, Digital Image Processing, Geographic Information System (GIS) and Global Navigation Satellite System (GNSS) technologies and their applications in various aspects of spatial planning. The programme is intended to provide deep knowledge and hands-on training to the learners in the recent developments in geo-information technologies. This programme would be to develop professional skills in this field of geo- informatics to pursue a career in the field of regional planning, town planning, rural planning, watershed based planning, land use planning and disaster management. As a practical oriented PG Diploma Programme, ***the focus is to impart and enhance their analytical skills using GIS tools for presentation, communication and decision making which forms the bedrock of any spatial planning as a profession***. Students will have a basic understanding of the emerging field of Smart or Intelligent Planning through the application of geo-spatial technology.

1.1 Objective of the programme

The **Post Graduate Diploma in Geoinformatics for Spatial Planning** is a one year program offered by the Department of Geography is an excellent blend of knowledge and practice in the field of Geospatial Technology and Spatial Planning. The program is targeted for creating qualified planning professionals skilled in using geospatial technology. The Program also offers internship for project work to be involved in real time planning projects. This PG Diploma programme is envisaged to:

1. Provide planning professionals with a full understanding of GIS & RS concepts, principles and how they can be applied for spatial planning.
2. Undertake field data collection and analysis for any spatial planning with GIS as well as data management and synthesis and Utilize geo-spatial tools to identify and map growth trends, patterns and problems within the planning sector in any spatial context.
3. Perform various GIS analysis workflows and modeling to aid decision making in spatial planning and management context.
4. Learn and promote Open Source GIS both as platform for creating spatial databases, analysis, modeling tool; and for disseminating information to internal & external stakeholders.

1.2 Outcome of the Programme

On completion of this P G Diploma, the participants are expected to:

- Obtain solid skills and experience is application of Geoinformatics in spatial planning.
- Acquire knowledge and skills needed for the collection, interpretation, and management of spatial information, using remote sensing and geographic information systems to support various aspects of spatial planning.
- Gain in-depth skills using Geospatial tools that help in development of spatial plans, urban GIS databases, zoning and for spatial planning policy formulation and implementation.
- Get acquainted with relevant GIS and other geo-techniques to provide project specific solutions in the field of spatial, urban and regional planning.

1.3 Duration of the Programme

Duration of the Post Graduate Diploma in Geospatial Technology for Spatial Planning is one (01) year- fulltime course divided into 2 semesters.

1.4 Number of Seats

This course has an intake of 15 seats per batch, including all reservations. The number of seats reserved for various reservation categories will be as per the reservation norms of Kannur University announced from time to time. The rotation matrix of the seats in the course will be announced at the time of notification of the program.

1.5 Course Structure

This course contains total 6 papers in first semester and 6 papers in second semester along with 4 months project work using any of the topics studied to earn the Diploma. All these components are mandatory for the completion of the course.

Semester	Theory	Practical
Semester I	4	2
Semester II	3	3
	Including Project and Viva Voce	

Semester Wise Credit Distribution

Course	Credit/ Paper	**Semester I**		**Semester II**		**Total Credits**
		No. of papers	Credit	No. of papers	Credit	
CORE	4	6	24	6	24	**48**
TOTAL	**4**	**6**	**24**	**6**	**24**	**48**

1.6 Eligibility

Masters Degree in Geography, Geology, Environmental Science, Physics or Computer Science with a minimum aggregate of 55% marks or equivalent grade. Eligibility for admission for reserved categories shall be according to the rules framed by the University from time to time.

1.7 Course Fees Structure

Description	**I Semester**	**II Semester**
Admission Fee	555	-
Students Affiliation Fee	485	-
Tuition Fee (Per Semester)	12000	12,000
Library Fee	325	325
Special Fee	125	-
University Union Fee	125	-
Students Welfare/Development Fee	320	-
Caution Deposit (Refundable)	1000	-
Laboratory Fee	5000	5000
University Development Fee (excluding SC/ST)	70	-
Department Development Fund	1000	-
Alumini Fee	100	
Total	**21105**	**17325**

Vide the order - SWC llUl-111/Fee Structure/2022 Dated: 09.06.2023

1.8 Department Council: The Department Council will review the course progress periodically. Any specific amendment in the syllabus, evaluation, or any other matter that is not mentioned in these regulations related to the P G Diploma programme will be discussed in the department council, and suitable action will be taken.

II EVALUATION

There will be two types of evaluations: continuous evaluation (CE) and end-of-semester evaluation (ESE). Continuous evaluation (CE) will be done by the faculty members who handle the course, and ESE will be conducted by the university. The proportion of the distribution of marks, including CE (continuous evaluation) and ESE (end semester examination), shall be 40:60. Students have to secure a minimum of 50 percent or an equivalent grade point for CE and ESE together for each individual course except project. For the project module, a minimum of 50% is required for both CE and ESE components separately.

2.1 Continuous Evaluation (CE):

Continuous Evaluation (CE) of a course shall be based on periodic written tests, assignments, seminars, viva-voce, case studies, and project work. Considering the nature of the course, the continuous evaluation (CE) components for PGDCS theory courses and laboratory courses will be as follows: **Components of Continuous Evaluation (Theory)**

Sl. No	Component	Marks
1.	Seminar	10
2.	Case studies / Mini Project(individual)	10
3.	Assignments	05
4.	Test	15
	Total	**40**

Components of Continuous Evaluation (Practical)

Sl. No	Component	Marks
1.	Record Work/Lab Assignments	10
2.	Implementing the experiments/assignments in the Lab	15
3.	Viva-voce	15
	Total	**40**

Seminar : Each student should select a relevant topic and prepare a seminar report for each theory course under the guidance of a faculty member. Students should prepare an abstract of the topic and distribute it to every faculty member at least one week ahead of the seminar. The presentation shall be of a minimum of 30 minutes duration. (Mark distribution: 50% for report and 50% for presentation and discussion.)

Assignments : Each student shall be required to submit a minimum of one assignments for each course. The details, such as the number of assignments, mark distribution, and weightage for each assignment, will be announced by the faculty in charge of the course at the beginning of the semester.

Tests : A minimum of two class tests will be conducted for each course. The details, such as the number of tests, mark distribution, and weightage for each test, will be announced by the faculty in charge of the course at the beginning of the semester.

Case studies / Mini projects/ Lab Assignments : Each student should carry out a case study or mini project for each theory subject, and an experimental or study report should be submitted to the faculty in charge for consideration against the continuous evaluation component.

Attendance : The minimum attendance required for each course shall be 60% of the total number of classes conducted for each semester. Those who secure the minimum attendance in a semester alone will be allowed to register for the end-of-semester examination. Maximum of 10 days of attendance will be condoned for the entire Course Period (1 Year) ; subjected to the approval of the Vice Chancellor. The benefit of condonation of attendance will be granted to the students on health grounds for participating in University Union activities, meetings of the university bodies, and extracurricular activities on the production of genuine supporting documents with the recommendation of the Head of the Department concerned. A student who is not eligible for condonation shall repeat the course with the subsequent batch.

2.2 End-Semester Evaluation (ESE).

The End Semester Examinations of each semester for theory and practical's, including projects, will be conducted by the Controller of Examinations.

2.2.1 End Semester Evaluation of Theory courses

ESE-Theory examinations will be scheduled and conducted by the Controller of Examinations in consultation with the Head of the Department. The tabulation registers for each semester shall be prepared and maintained by the Examination Branch. For the evaluation of answer scripts, there shall be a minimum of one external examiner (as chief) along with the panels of internal examiners (as additional) to ensure transparency in the conduct of examinations. The external examiners will be faculty members appointed from other colleges or departments of this university or from other universities, scientists, or engineers from recognized R&D organizations. The duration of the end-of-semester examination for theory shall be 3 hours with a maximum mark of 60. The pattern of questions will be the

same as the pattern of questions for the PG-University department. Re-valuation of the answer script follows the regulations for re-valuation of PG programs in the university department.

2.2.2 Pattern of questions and Evaluation Criteria for (ESE)

Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The duration of examination is 3 hours only. The question paper of end semester theory examination shall consist of three parts.

Part A

(Short answer type)

Answer any five questions and each question carry 3 marks

1.

2.

3.

4.

5.

6. (5*3 = 15 marks)

Part B

(Short answer type)

Answer any three questions and each question carry 5 marks

7.

8.

9.

10.

11. (3*5 = 15 marks)

Part C

(Short answer type)

Answer any three questions and each question carry 10 marks

12.

12.

13.

14.

15.

16. (3*10 = 30 marks)

2.2.3 Module based mark distribution for (ESE)

Module based mark distribution for each paper will be in such a way that each module will be allotted with 15 marks as follows;

Sl. No	Modules	Marks
1.	Module 1	15
2.	Module 2	15
3.	Module 3	15
4	Module 4	15
	Total	**60**

2.2.4 End Semester Evaluation of Practical courses

The end-semester examination for practical courses will be conducted by the controller of examinations with a duly approved panel submitted by the Head of the Department. The components for practicals will be as follows:

Sl. No	Component	Marks
1.	Record Work/Lab Assignments report	10
2.	Implementing the experiment in the Lab	40
3.	Viva-voce	10
	Total	**60**

2.2.5 Project

A Project has to be undertaken by all students enrolled in the program. The hours allotted for project work may be clustered into a single slot so that students can do their work at a center or location for a continuous period of time. The major project work should be carried out in the department or institution or in an industry or R&D organization of national repute. Project work shall be carried out under the supervision of an expert in the area. If the project is carried out in an industry or R&D organization outside the campus, then a co-guide shall be selected from the concerned organization. If

the project work is of an interdisciplinary nature, a co-guide shall be taken from the other department concerned. Every student should do the project individually, and no grouping is allowed. The candidates are required to get the synopsis approved by the department before the commencement of the project. At the end of the semester, the candidate shall submit the project report duly approved by the guide and co- guide for end-of-semester evaluation. The project report shall be prepared according to the guidelines announced by the department from time to time.

Evaluation of Project :

1. A departmental committee duly constituted by the head of the department will review the project periodically.
2. **Continuous Assessment of Project Work:** There shall be three internal presentations before the committee (minimum two members, including the guide). The assessment is based on the presentation, interim report, and viva voce. The total mark for CA shall be divided among the three presentations in the following ratio **20%:30%:50%.** Each internal presentation shall be evaluated based on the following components:

	COMPONENTS	**% OF MARKS**
I	Understanding of the problem / concepts	25%
II	Adhering to methodology	20%
III	Quality of presentation and demonstration	15%
IV	Quantum of work / effort	30%
V	Organization and content of Project report	10%

3. **End Semester Assessment of Project :** A board of two examiners (one external and one internal) appointed by the university shall conduct the ESE evaluation. The evaluation shall be based on the report, presentation of the work, demonstration of the work, and a detailed viva voce based on the work carried out. A candidate will not be permitted to attend the project evaluation without duly certified project reports. Also, a project will be evaluated only if the candidate attends the ESE presentation and viva voce on the scheduled date and time. The end-of-semester evaluation shall consist of the following components:

	COMPONENTS	**% OF MARKS**
I	Understanding of the problem/requirements/ concepts related to the project	15
I I	Methodological frame work	15
III	Quality of analysis and Modeling of the problem and solution/ database design, relevance /novelty of the work, presentation of results/findings)	20

IV	Cartographic skill, Quality of presentation / demonstration	15
V	Over all quantum of work / effort - assessed through the content of report, presentation and viva.	25
V I	Organization and content of report	10

4. A student shall pass the project course if she or he secures a separate minimum of 50% for the CE and ESE and 50% for the ESE and CA put together.
5. If a candidate fails the project evaluation, he or she has to repeat the project course along with the next batch and undergo both CA and ESE. Unlike theory and practical courses, the CA mark will not be retained.
6. There shall be no improvement chance for the marks obtained in the project course.

III GRADING

An alphabetical grading system shall be adopted for the assessment of students performance in a course. The grade is based on a ten-point scale. The following table gives the range of marks, grade points, and the alphabetical grade. A minimum of grade point 5 (Grade C) is needed for the successful completion of a course.

Range of marks %	**Grade points**	**Alphabetical grade**
95-100	10	O
85-94	9	A+
75-84	8	A
65-74	7	B+
55-64	6	B
50–54	5	C
Below 50	0	F

The performance of a student at the end of each semester is indicated by the grade point average (GPA), which is calculated by taking the weighted average of the grade points of the courses successfully completed. The following formula is used for the calculation: The average will be rounded off to two decimal places.

GPA $= \frac{\text{Sum of (grade points in a course multiplied by its credit)}}{\text{Sum of credits of courses}}$

The overall performance of a student is indicated by the cumulative grade point average (CGPA) and is calculated using the same formula given above. The empirical formula for calculating the percentage of marks will be CGPAx10. Based on the CGPA, the overall letter grade of the student shall be determined in the following way, *(Conversion of Grades into classification)*

CGPA	**Overall Letter Grade**	**Classification**
9.5 and above	O	First class with exemplary
8.5 and above but less than 9.5	A+	First class with distinction
7.5 and above but less than 8.5	A	
6.5 and above but less than 7.5	B+	First Class
5.5 and above but less than 6.5	B	
5 and above but less than 5.5	C	Second class

3.1 Grade Card

The Controller of Examination, Kannur University, will issue the Semester-wise grade card, consolidated grade statement based on the authenticated documents submitted by the Head of the Department after the approval of the department council at the end of each semester. The final PG Diploma Certificates will be issued by the University.

3.2 Supplementary Examinations for Failed Candidates

1. Candidates who have failed (F grade) in the semester examinations (except project work) can appear for the failed papers for the particular semester along with regular However, the Continuous Evaluation (CE) marks will remain the same. Two such supplementary chances will be given for each semester within two years.
2. In the event of failure in project work, the candidate shall re-register for project work, redo the project work, and resubmit the project report fresh for evaluation. The Continuous Evaluation marks shall be freshly allotted in this case.

Appearance for continuous evaluation and end-semester evaluation is compulsory, and no grade shall be awarded to a candidate if he or she is absent for CE, ESE, or both. A student who fails to complete the program or semester can repeat the full program or semester once if the department council permits it. There shall be no provision for the improvement of CE marks. The maximum period for completing the PG Diploma will be 2 years.

PROGRAMME STRUCTURE

Semester I

Course Code	Paper	*Instructional Hrs./week*			Credit
		L	**P**	**T**	
PGDGGY01C01	Geoinformatics	4	0	2	4
PGDGGY01C02	Earth System Science	4	0	2	4
PGDGGY01C03	Information Technology and Programming Languages	4	0	2	4
PGDGGY01C04	Geoinformatics for Spatial Planning	4	0	2	4
PGDGGY01C05	**Practical – I** DIP and Spatial Data Management	4	6	2	4
PGDGGY01C06	**Practical – II** Geospatial Technology and Spatial Planning	4	6	2	4
Total		24	12	12	24

Semester II

Course Code	Paper	*Instructional Hrs./week*			Credit
		L	**P**	**T**	
PGDGGY02C07	Geospatial Technology for Urban Planning	4	0	2	4
PGDGGY02C08	Geospatial Technology for Disaster Management	4	0	2	4
PGDGGY02C09	Geospatial Technology for Natural Resource Management	4	0	2	4
PGDGGY02C10	**Practical – III** Geospatial Modeling	4	6	2	4
PGDGGY02C11	Project	-	4	-	6
PGDGGY02C12	Viva Voce	-	-	-	2
Total		16	10	8	24

PGD – Post Graduate Diploma
GGY – Geography
C - Core Course
CE - Continuous Evaluation
ESE - End Semester Examination

L - Lecture
T - Tutorial
S - Seminar
P - Practical Course

SEMESTER I
CORE COURSE 1

Course Title and Code	**PGDGGY01C01**	**GEOINFORMATICS**

Course Objectives	● Understand the definition, concept and types of Geoinformatics techniques. ● Develop the knowledge about its application in various fields of spatial planning. ● Evaluate the possibilities of latest developments in Geoinformatics and assess its advantage and disadvantages. ● Apply interdisciplinary knowledge in application of Geoinformatics in various research fields.	
Modules	**Content**	**No. of hours**
Module 1 Geographic Information System	GIS basic concepts, history, overview and components, GIS data sources and data models (spatial, aspatial and vector, raster), Database management and data input techniques - Geoid, Datum, co-ordinate systems, Georeferencing and Projections, Digitalization, Editing of data, Concept of topology, Data conversion and manipulation, GIS and Remote Sensing data integration, Thematic mapping and Analysis. Spatial and attribute queries, Introduction to various GIS Softwares, Desktop GIS, Web GIS, Customized GIS, Recent trends in GIS and Open data sources and softwares.	**24**
Module 2 Remote Sensing	Introduction to concept and stages of Remote Sensing, Types of remote sensing, advantages and limitations of RS techniques, Electromagnetic Radiation, Atmospheric windows, Interaction of EMR with earth surface features, spectral signature, spectral response pattern of various surface objects, Types of Resolution. Introduction to Aerial Photography and Photogrammetry, Satellite platforms and sensors, IRS series of satellites, LANDSAT, SPOT, IKONOS, QUICKBIRD, MODIS, RADARSAT, NOAA, TERRA, MOS and ERS. Visual interpretation of satellite images- elements and keys, advances in space research and planetary remote sensing.	**15**
Module 3 GNSS and Total Station Survey	Global Navigation Satellite System (GNSS)-history, fundamental concepts and elements. Basic geodesy, Coordinate systems, Methods of GNSS survey. Total Station Survey. Accuracy of different survey methods, Application of GPS survey in various fields.	**20**
Module 4 Modeling and Analysis using Geoinformatics	Application of Geoinformatics in spatial modeling and analysis of real world issues. Introduction to the concepts of spatial analysis, Vector and Raster modelling techniques. Application of Geoinformatics in spatial planning – Urban, Land use, Transport, Resource management, Disaster management, Agriculture.	**21**

Course Outcomes	• Apply Geoinformatics techniques in various spatial planning work. • Assess the implementation and possibilities of Geoinformatics in Spatial Planning. • Selective usage of geospatial technology for special purpose of planning. • Engage in interdisciplinary application of Geoinformatics in various research fields.

Essential Readings

1. Paul A Longley, Michael F. Goodchild, David J Maguire (2005) Geographical Information Systems, Techniques, Management and Applications.
2. Aronoff S,(1989) Geographic Information Systems: A Management Perspective, WDL Publications
3. Burrough, P.A. (2005), Principles of GIS for Land Resource Assessment, Oxford Publications, 2005
4. Chrisman N R (2001) Exploring Geographic Information System, Wiley
5. Fraser, Taylor D R (2013) Geographic Information Systems, Pergamon
6. George Joseph (2003) Fundamentals of Remote sensing, University Press
7. Good Child etal (2018) Geographic Information Systems and science, Wiley
8. John E. Harmon & Steven J. Anderson (2003) The design and implementation of Geographic Information Systems, John Wiley &Sons, .
9. Ian Heywood et.al (2002) An Introduction to Geographical Information System, Pearson Education Private Limited, Delhi.
10. Kraak, M. and Brown, A (2001) Web Cartography: Development and Prospects, Taylor and Francis, London.
11. Kang Tsung Chang (2008) Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
12. Loo C P and Albert K W Y (2004) Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi.
13. Marble, D.F & Calkins, H.W.(1990) Basic Readings in Geographic Information System, Spad System Ltd.
14. Michael N DeMers (2005) Fundamentals of Geographic Information System, John Wiley and Sons, New Delhi.
15. Paul A Longley et.al (2001) Geographic Information System and Science, John Wiley and Sons, Chichester.
16. Star J and Estes (1989) Geographic Information Systems: An Introduction, Prentice Hall
17. Tereshenkov, A (2009). Web GIS Application in Local Government, VDM Verlag,
18. Thanappan Subash. (2011) Geographical Information System, Lambert Academic Publishing,

CORE COURSE 2

Course Title and Code	PGDGGY01C02	EARTH SYSTEM SCIENCE

Course Objectives	• Understand the fundamentals of Earth and its structure, • Develop knowledge on various agents of Earth processes, • Derive overview of different types of rocks and its weathering process. • Understand the dimensional representation of earth. • Evaluate the availability of various resource on the earth.

Modules	Content	No. of hours
Module 1 Lithosphere	Earth as a planet- Landforms- geomorphic processes – endogenic and exogenic- Rocks – Weathering- physical weathering and chemical weathering. Mass wasting, soils, their formation, classification, soil profiles, agents of gradation and different landforms.	**24**
Module 2 Atmosphere	Structure and composition of atmosphere, insolation – temperature, pressure, wind, precipitation, airmass, cyclones, climatic regions. Weather analysis and Forecasting, Climate Change: Causes and Impacts.	**15**
Module 3 Hydrosphere	Hydrologic cycle, surface and subsurface water resources of water, - streams, rivers, lakes, oceans and currents. Groundwater - Groundwater and it's sources, types of aquifers, recharging of groundwater, Global water balance.	**20**
Module 4 Biosphere	Fundamental concepts of biosphere on earth, ecosystem - biotic and abiotic components, biomes, biomass, natural vegetation, biodiversity of life, energy cycle and efficiency of solar energy utilization, energy transfer and pyramids, conservation of ecosystem	**21**

Course Outcomes	• Use Geospatial prospect for dealing with various earth related studies. • Develop the knowledge about its application in various fields of spatial planning. • Evaluate the possibilities of latest developments in Geoinformatics and assess its advantage and disadvantages. • Apply interdisciplinary knowledge in application of Geoinformatics in various research fields.

Essential Readings

1. Barry, R.G., and Chorley, R.J. (2010): Atmosphere, Weather and Climate, Routledge, London, 516 pp.
2. Bhattacharya, S.K. 1988. Urban Domestic Water Supply in Developing Countries, CBS Publishers, CR Distributors, Delhi.
3. Chow, V.T., Maidment, D.R. and Mays, W.L. (1988) Applied Hydrology, McGraw-Hill International Editions, McGraw-Hill Book Company, New York.
4. Chow V.T (2017) - Handbook of Applied Hydrology, Tata McGraw Hill, New Delhi
5. Jain, S.K., Aggarwal, P.K. and Singh, V.P. 2007. Hydrology and Water Resources of India, Springer, The Netherlands.
6. Byers R.H. (1974): General Meteorology, McGraw Hill BKCo New York.
7. Critchfield, H.J, (2009): General Climatology; Prentice Hall, London
8. Das P. K. (1995): The Monsoon, Prayag Pustak Bhavan, Allahabad, National Book Trust.India
9. Ela Dean, (2017); Principles of Atmospheric Science, Larsen and Keller Education, 249 pp.
10. Hobbs, J.E. (1980): Applied Climatology, Butterworth, London.
11. John E Oliver and John J Hidore 2003, Climatology – An Atmospheric Science, Pearson Education Private Limited, Delhi.
12. K Siddhartha (2018), Oceanography: A Brief Introduction, Kitab Mahal, India
13. Dennis S Hartman (1994), Global Physical Geography, Academic Press, London
14. Mysooru R Yadupathi Putty, 2020, Fundamentals of Hydrology, Wiley India.
15. Prasad Prem Kumar, 2016, Biosphere Forms and Functions, Daya Publishing House
16. Spark, B. W. (1986): Geomorphology, Longman, London.
17. Strahler, A.N (1992): Physical Geography. John Wiley & Sons Inc., New York.
18. Thomas, M.F. (1974): Tropical Geomorphology, Macmillan, London
19. Thornbury W.D (1969) Principles of Geomorphology, Wiley Intl. Edn & Wiley Eastern Reprints 1984.
20. Wooldridge S W and R. S. Morgan (2004)–The Physical Basis of Geography - An Outline of Geomorphology, Orient Longman Private Limited.
21. Worcester, P. G. (1948): Textbook of Geomorphology, Princeton, D.Van, Nortrand.

CORE COURSE 3

Course Title and Code	**PGDGGY01C03**	**INFORMATION TECHNOLOGY AND PROGRAMMING LANGUAGES**

Course Objectives	● Understand the basics of information technology and programming. ● Develop skills of customizing and running scripts using C,C++ and Python languages ● Acquire skill of dealing with DBMS using JAVA and SQL. ● Understand the potentiality of Python language in customizing and modeling works for spatial planning using Geoinformatics.

Modules	**Content**	**No. of hours**
Module 1 Information Technology	Information Technology and Internet applications, Introduction to Java script. Useful softwares and Protocols. Societal impacts of information technology, Disaster recovery, Intellectual property rights, careers in information technology. Future of Information Technology.	**24**
Module 2 Database Management	Database management system (DBMS), SQL and Relational database concepts, Entity relationship model, Implementation of the relational operators in SQL, Boolean operators and Pattern matching, Arithmetic operations, Group functions, Processing data and time information, Complex queries and set operators.	**15**
Module 3 Programming	Problem solving using computers – algorithms, flow charts, pseudocode, programming languages and its classifications, Overview of C, C++ and python languages. Installing Python Interpreter, importing various libraries, working with numbers, variables, writing statements, strings, lists, use of python objects, functions, methods, paths, built-in modules, external modules, controlling flow with conditional statements, looping structures, getting user input, commenting scripts and error handling.	**20**
Module 4 Application i n Geoinformatics	Python for GIS – Geoprocessing with python, importing ArcPy, use of built-in tools, setting environments, tool messages, working with vectors and its geometries, raster data handling, batch processing, map automations, working with toolbox, model builders and development of Graphical User Interfaces(GUI), Programming for Web GIS, JavaScript for Web GIS Programming, Introduction to Leaflet JavaScript API.Application of AI/ML to solve spatial problems. Matlab	**21**

Course Outcomes	● Use basic skills of information technology and programming. ● Customize and run scripts using C,C++ and Python languages ● Acquire skill of dealing with DBMS using JAVA and SQL. ● Utilize the potentiality of Python language in customizing and modeling works for spatial planning using Geoinformatics.

Essential Readings

1. Aronoff S,(1989) Geographic Information Systems: A Management Perspective, WDL Publications
2. Burrough, P.A. (2005), Principles of GIS for Land Resource Assessment, Oxford Publications, 2005
3. Chrisman N R (2001) Exploring Geographic Information System, Wiley
4. Fraser, Taylor D R (2013) Geographic Information Systems, Pergamon Somashekara M. T. “Problem solving with C”, Eastern Economy Edition (PHI).
5. Balagurusamy E, Object oriented Programming with C++, Fourth Edition, The McGraw-Hill Education.
6. Paul A Longley, Michael F. Goodchild, David J Maguire (2005) Geographical Information Systems, Techniques, Management and Applications.
7. Seymour Lipschutz, “Data Structures”.
8. Ramon A Mata-Toledo, “Database Management Systems,” The McGraw-Hill Companies.
9. Muthu C, “Programming with Java,” Second Edith, Vijay Nicole Imprints Private Limited.
10. Pimpler E, Programming ArcGIS with Phython Cookbook. Packt Publishing Ltd,2015.
11. Star J and Estes (1989) Geographic Information Systems: An Introduction, Prentice Hall
12. Tereshenkov, A (2009). Web GIS Application in Local Government, VDM Verlag,
13. Thanappan Subash. (2011) Geographical Information System, Lambert Academic Publishing,
14. Zelle and Jhon M, Phython Programming an Introduction to Computer Science, Franklin, Beedle and Associate, Inc, 2004.

CORE COURSE 4

Course Title and Code	**PGDGGY01C04**	**GEOINFORMATICS FOR SPATIAL PLANNING**

Course Objectives	• Understand the potentiality of Geoinformatics in spatial planning. • Develop skills in regional planning with specialization in land use, resource management and network planning. • Understand issues and challenges in spatial planning and suggest the suitable solutions in various fields. • Apply scientific methods in developing spatial planning and developing skills to utilize PRA for implementing plans.

Modules	Content	No. of hours
Module 1 Concept of Spatial Planning	Norms and standards of spatial planning, Theories of spatial planning and economic development, Spatial patterns of regional imbalance in India – micro and macro level, Planning in India, Micro and Multilevel planning, Planning programmes in India.	**24**
Module 2 Land use Planning	Land use and classification, land use survey, issues and challenges, Land evaluation, land use pattern, Land use planning - models and approaches.	**15**
Module 3 Resource Management	Resources and its classifications, Significance of resource conservation and management, role of geoinformatics – soil, forest, agriculture management, mine planning, oil and gas exploration, site suitability for dams, atomic power plants.	**20**
Module 4 Network based planning	Concept of utility or flow network, importance and applications of network theory, web applications of social networks, Network data models. Application of Geoinformatics in network based planning - transportation, water distribution, sewage line and telecom.	**21**

Course Outcomes	• Utilize the Geoinformatics techniques in various spatial planning • Utilize the possibilities of latest developments in Geoinformatics and assess its advantage and disadvantages. • Apply interdisciplinary knowledge in application of Geoinformatics in various research fields. • Engage in various types of spatial planning in different stages for scientific and geospatial application.

Essential Readings

1. ArcGIS 10.1 Manuals, 2013.
2. Aronoff S,(1989) Geographic Information Systems: A Management Perspective, WDL Publications
3. Burrough, P.A. (2005), Principles of GIS for Land Resource Assessment, Oxford Publications, 2005
4. Chrisman N R (2001) Exploring Geographic Information System, Wiley
5. Fraser, Taylor D R (2013) Geographic Information Systems, Pergamon
6. John E. Harmon & Steven J. Anderson (2003) The design and implementation of Geographic Information Systems, John Wiley &Sons, .
7. Ian Heywood et.al (2002) An Introduction to Geographical Information System, Pearson Education Private Limited, Delhi.
8. Kraak, M. and Brown, A (2001) Web Cartography: Development and Prospects, Taylor and Francis, London.
9. Kang Tsung Chang (2008) Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
10. Loo C P and Albert K W Y (2004) Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi.
11. Marble, D.F & Calkins, H.W.(1990) Basic Readings in Geographic Information System, Spad System Ltd.
12. Michael N DeMers (2005) Fundamentals of Geographic Information System, John Wiley and Sons, New Delhi.
13. Paul A Longley et.al (2001) Geographic Information System and Science, John Wiley and Sons, Chichester.
14. Star J and Estes (1989) Geographic Information Systems: An Introduction, Prentice Hall
15. Tereshenkov, A (2009). Web GIS Application in Local Government, VDM Verlag,
16. Thanappan Subash. (2011) Geographical Information System, Lambert Academic Publishing,

CORE COURSE 5

Course Title and Code	**PGDGGY01C05**	**DIP AND SPTIAL DATA MANAGEMENT**

Course Objectives	• To assess spatial data and its utility • Understand the satellite image processing using various softwares. • Evaluate and apply the techniques for satellite image enhancement and image restoration • Understanding of various image classification schemes

Modules	Content	No. of hours
Module 1 Techniques of Image Processing	ERDAS based image preprocessing, corrections, enhancement techniques, Image transform, Image compression models. Initial statistical extraction, source encoder and decoder, channel encoder decoder.	**24**
Module 2 Image Segmentation and boundary detection	Image segmentation, Edge linking and boundary detection, Local processing, Global processing via Hough transform, Thresholding, foundation, role of illumination, simple global thresholding, optimal thresholding, Split and merge and Texture based Segmentation. Data merging techniques.	**15**
Module 3 Image classification and Change detection	Geometrical basis of classification, Pattern recognition, training sample selection, techniques of classification, change detection algorithms, image differencing, image rationing, supervised and unsupervised techniques, accuracy assessment classification comparisons, Map composition.	**20**
Module 4 Remote Sensing Data Handling	Data handling and processing of Remote Sensing data -histogram construction, scene enlargement, rationing and enhancement, application of spatial filters; transformations, colour display techniques.	**21**

Course Outcomes	• Utilize DIP for remote sensing based assessment and analysis work related to spatial planning. • Apply the DIP techniques for deriving thematic maps and data for spatial planning purpose. • Evaluate the availability of resources, its spatial distribution, periodical changes etc., using raster data processed with DIP process.

Essential Readings

1. George Joseph and C Jaganathan (2018) Fundamentals of Remote Sensing, Third Edition, Orient Black Swan.
2. Campbell J. B. and Wynne R. H. (2008) Introduction to Remote Sensing, Fifth Edition, The

Guilford Press, New York, 718p.

- Falkne, E. and Morgan D. (2002) Aerial Mapping: Methods and Application. Lewis Publishers, Boca Raton, 192p.
- Lillesand T.M., Kiefer R.W. and Chipman J.W. (2004) Remote sensing and image interpretation, Fifth Edition, Wiley, NJ, 812p.
- Mather P.M. and Koch M. (2011) Computer Processing of Remotely-Sensed Images –
- Loo C P and Albert K W Y (2004) Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi.
- Marble, D.F & Calkins, H.W.(1990) Basic Readings in Geographic Information System, Spad System Ltd.
- Michael N DeMers (2005) Fundamentals of Geographic Information System, John Wiley andSons, New Delhi.
- Paul A Longley et.al (2001) Geographic Information System and Science, John Wiley and Sons, Chichester McCoy R.M. (2005) Field methods in remote sensing. Guilford Press, New York,
- Star, J.L., J.E. Estes, and K.C. McGwire,1997, Integration of GIS and Remote Sensing, Cambridge University Press.
- Zelle and Jhon M, Phython Programming an Introduction to Computer Science, Franklin, Beedle and Associate, Inc, 2004.

CORE COURSE 6

Course Title and Code	PGDGGY01C06	GEOSPATIAL TECHNOLOGY AND SPATIAL PLANNING

Course Objectives	● Hands-on experience in dealing with ArcGIS, QGIS, SAGA GIS, ENVI,GeoDa, DGNSS and Total Station Survey. ● Develop skills of customizing and running scripts using C,C++ and Python languages and acquire skill of dealing with DBMS using JAVA and SQL. ● Understand the process and organization of SDMS which can be used for DSS in various Spatial Planning. ● Develop knowledge and skills in dealing with various aspects of spatial planning based on some real data based analysis and modeling tasks.

Modules	Content	No. of hours
Module 1 Techniques of Geoinformatics	ESRI ArcGIS, Data input techniques, Georeferencing, Vectorization, Data editing and Geodatabase management, Layer creation and management, Topology check, Analysis – geographic analysis, spatial analyst, 3D analysis, proximity analysis, Network analysis, Survey analyst, Geostatistical analyst, Spatial Auto correlation, Remote Sensing data based spatial modeling – DEM,DTM, DSM, Gravity model, Thematic mapping.	**24**
Module 2 Remote Sensing and GNSS Survey	Aerial Photography and Photogrammetry, Aerial photo visual interpretation, Scale based calculation, ENVI/ERDAS/SAGA/QGIS software for Image processing and analysis. Total Station survey, DGNSS survey.	**15**
Module 3 Information Technology and Programming	Data structures and file handling, basics of C, C++, Python, VB.NET, ASP.NET, creation of forms using control variables, menu creation, adding database and maps in VB projects.	**20**
Module 4 Spatial Planning using Geoinformatics	Preparation of micro level resource maps - digital Socio-Economic survey and Asset mapping, preparing spatial database management system(SDMS), ground truth verification, Spatial data analysis with GeoDa- finalization of spatial modeling and planning – agriculture, urban, land use, transportation, disaster vulnerability and management.	**21**

Course Outcomes	● Apply Geoinformatics techniques in various spatial planning work. ● Assess the implementation and possibilities of Geoinformatics in Spatial Planning. ● Selective usage of geospatial technology for special purpose of planning. ● Engage in interdisciplinary application of Geoinformatics in various research fields.

Essential Readings

1. ArcGIS 10.1 Manuals, 2013.
2. Aronoff S,(1989) Geographic Information Systems: A Management Perspective, WDL Publications
3. Burrough, P.A. (2005), Principles of GIS for Land Resource Assessment, Oxford Publications, 2005
4. Chrisman N R (2001) Exploring Geographic Information System, Wiley
5. Fraser, Taylor D R (2013) Geographic Information Systems, Pergamon
6. John E. Harmon & Steven J. Anderson (2003) The design and implementation of Geographic Information Systems, John Wiley &Sons, .
7. Ian Heywood et.al (2002) An Introduction to Geographical Information System, Pearson Education Private Limited, Delhi.
8. Kraak, M. and Brown, A (2001) Web Cartography: Development and Prospects, Taylor and Francis, London.
9. Kang Tsung Chang (2008) Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
10. Loo C P and Albert K W Y (2004) Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi.
11. Marble, D.F & Calkins, H.W.(1990) Basic Readings in Geographic Information System, Spad System Ltd.
12. Michael N DeMers (2005) Fundamentals of Geographic Information System, John Wiley and Sons, New Delhi.
13. Paul A Longley et.al (2001) Geographic Information System and Science, John Wiley and Sons, Chichester.
14. Star J and Estes (1989) Geographic Information Systems: An Introduction, Prentice Hall
15. Tereshenkov, A (2009). Web GIS Application in Local Government, VDM Verlag,
16. ThanappanSubash. (2011) Geographical Information System, Lambert Academic Publishing,