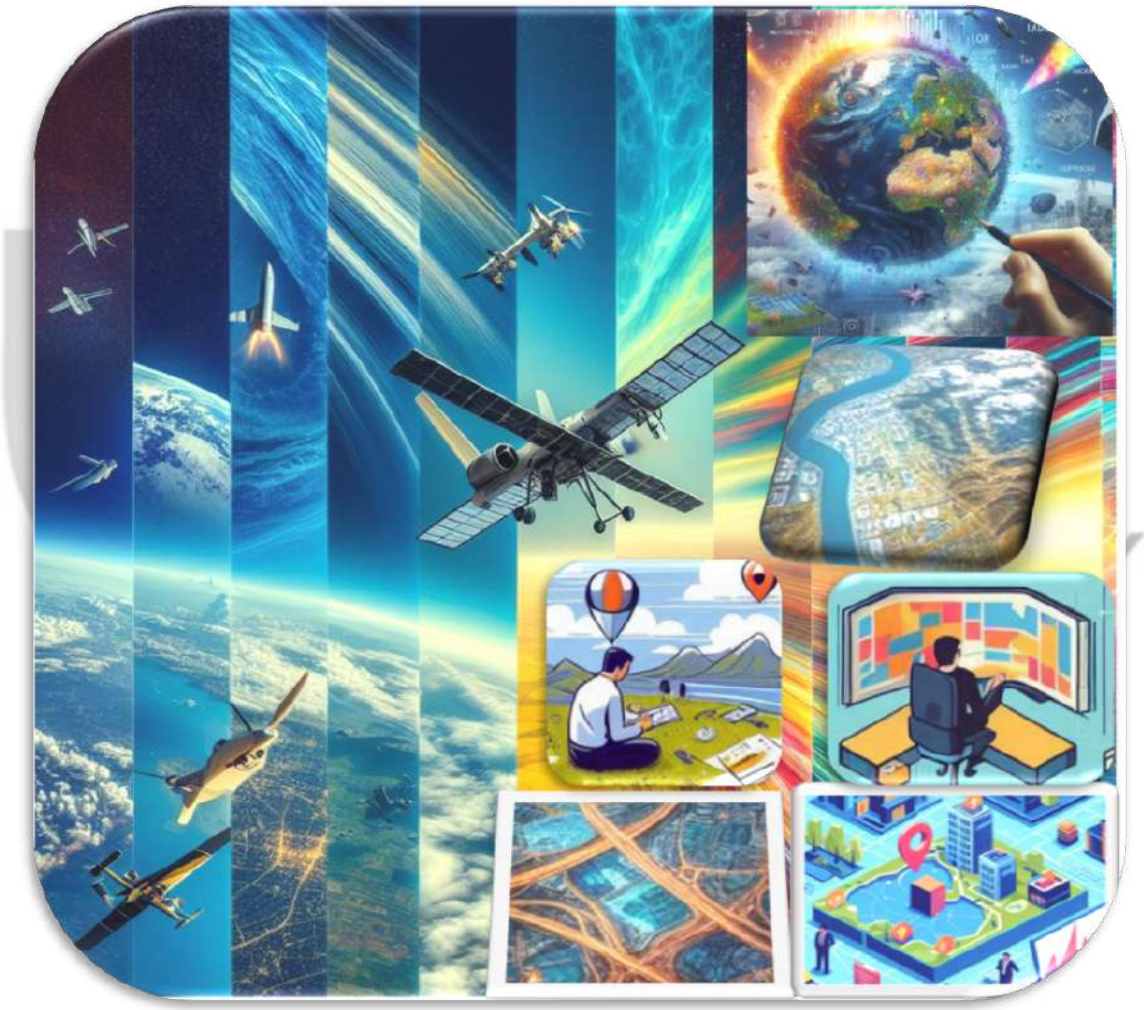
Programme Guide

For

M.Sc. Geoinformatics

(Programme Code: MSCGI)



School of Sciences
Indira Gandhi National Open University
New Delhi - 110 068

RECOGNITION

The UGC Notification No. F. 1-1/2020(DEB-I) dated 4th Sept., 2020 regarding recognition of Degrees and Certificates acquired through ODL mode states as under:

— 22. Equivalence of qualification acquired through Conventional or Open and Distance Learning and Online modes.— Degrees at undergraduate and postgraduate level in conformity with UGC notification on Specification of Degrees, 2014 and post graduate diplomas awarded through Open and Distance Learning mode and/or Online mode by Higher Educational Institutions, recognised by the Commission under these regulations, shall be treated as equivalent to the corresponding awards of the Degrees at undergraduate and postgraduate level and post graduate diplomas offered through conventional mode.

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Version – 1.3
January, 2026

Printed and published on behalf of the Indira Gandhi National Open University, New Delhi by Director, School of Sciences, Indira Gandhi National Open University, New Delhi.

Contents

Please note that the information given in the programme guide may change with time.

A Word with Learners

Dear Learner,

Welcome to the **MSc Geoinformatics (Programme Code: MSCGI)**, offered by the Geology discipline of the School of Sciences, by a challenging open and distance learning (ODL) mode. This programme is designed to provide you with a comprehensive and in- depth understanding of the fascinating field of geospatial science.

This programme intends to cater to the needs of the working professional in Industries, National laboratories, Research & Development organisations and academic institutions but it will also be helpful for the graduates aspiring to develop skills and get employment in all these places. You would agree that having to combat competition at the national and international levels, the working professional in the industry and academia need to be familiarised and develop skills in using geoinformatics for creation, processing, analysis and visualisation of spatial data for studying natural resources, disasters, *etc.* and their planning and management. We hope this programme would be able to accomplish all these envisaged targets.

The M.Sc. Geoinformatics programme has advanced courses in all the important and relevant areas in geospatial science. The programme comprises four semesters with 3 theory courses and 1 practical course in the first three semesters and a project work (**8 credits**) along with three theory courses in the fourth semester or two more theory courses in lieu of the project work. Details of the theory and practical courses are given inside.

The self-learning materials (SLMs) of theory courses will reach you after you are registered for this programme, if you have opted for hard copies of them while taking admission. Your **registration** for this programme will be valid for two years from the cycle of registration.

The **Term End Examinations (TEE) of theory courses** have 70% weightage of marks and these can be taken for each semester only at the end of that semester.

In order to facilitate your learning, there is a provision of **counselling sessions for theory and practical courses**, wherever applicable. Counselling for the theory and practical course is held at the respective study centres as per the University guidelines.

Please note that the counselling schedules for the theory and practical courses will be provided by the Coordinator / Programme-in-charge of the respective Study Centre. Therefore, it is advised to be in constant touch with your Study Centre.

There is lot more information you will come across while pursuing your study for the programme. The information or the source is available in the Programme Guide.

You must read and keep this Programme Guide carefully as you will have to refer to it from time to time and you will have minimum doubts about the frequently asked queries.

VISIT IGNOU WEBSITE FOR INFORMATION ON ALL FRONTS: http://www.ignou.ac.in

Wishing you all the very best!

- **MSCGI Programme Team**
School of Sciences
(mscgi@ignou.ac.in)

PAY ATTENTION

Our course materials are prepared in such a way that you can study them on your own. If you do not understand any part, take help from your counsellor at your Study Centre or from us. **Please do not use any guides for studying the IGNOU courses or solving assignments.** Such guides will neither help you in understanding the subject matter nor in passing the examinations.

OUR TERMINOLOGY

In IGNOU we use different terms from the ones used in conventional Colleges or Universities. So do please learn them. We use the terms:

- **Programme** for Course,
- **Course** for Paper, and
- **Discipline** for Subject.

YOUR STUDY CENTRE

At your Learner Support Centre, you get:

- all **information about the programme** and **learning support**;
- **face-to-face counselling** for every course by a senior and experienced teacher engaged as Academic Counsellor who will address and solve your difficulties for that course;
- **library** to read books, **facilities to listen/watch audio/video programmes provided**; and
- **laboratory to do your practical work.**

IMPORTANT: The Coordinator/ Assistant Coordinator/Programme in-charge for M.Sc. Geoinformatics Programme will help you with all your issues. If you face any issues in your Learner Support Centre, please e-mail to your Regional Centre with a copy to sos@ignou.ac.in quoting your programme, enrollment number, SC Code and RC code. Or write to us at the address:

Director, School of Sciences, Block D, Raman Bhawan, IGNOU, Maidan Garhi, New Delhi-110068

IGNOU WEBSITE

The IGNOU website is **http://www.ignou.ac.in**. It offers relevant information to the general public and student support facilities to the learners through the Single Window Information and Student Support (SWISS). These include:

- Admission announcements
- Online registration for fresh admission to various programmes through the portal https://ignouadmission.samarth.edu.in/
- Online Re-Registration
- Updates on the latest happenings at the University
- Checking registration details
- Checking status of dispatched study material
- Downloads of Assignments/Question papers/Forms
- Catalogue of audio/video programmes
- Schedule of Gyan Darshan/ Gyan Vani programmes
- Addresses of regional and Study Centres
- Online submission of Term-End Examination Form
- Term End Examination (TEE) date-sheet
- Examination Hall Ticket
- Results of the Term End Examinations and Grade Card
- Course Completion Status
- Accessing eGyanKosh: using this web site (https://egyankosh.ac.in) you can download your course material and view videos related to your courses.
- Student Portal (after admission): https://ignou.samarth.edu.in

All students are advised to register on the Student Portal after confirmation of their admission and create their own Student Account.

1. ABOUT THE UNIVERSITY

1.1 Introduction

Empowered by the IGNOU Act, the University holds a unique mandate to provide inclusive and equitable access to higher education across the nation and through its overseas learner support centres (LSCs), reflecting its expansive jurisdiction and global vision. The Indira Gandhi National Open University was established by an Act of Parliament in 1985 to achieve the following objectives:

- democratising higher education by taking it to the doorsteps of the learners
- providing access to high quality education to all those who seek it irrespective of age, region, religion and gender
- offering need-based academic programmes by giving professional and vocational orientation to the courses
- promoting and developing distance education in India
- setting and maintaining standards in distance education in the country as an apex body.

1.2 Prominent Features

IGNOU has certain unique features such as:

- international jurisdiction
- flexible admission rules
- individualised study: flexibility in terms of place, pace and duration of study
- use of latest information and communication technologies
- nationwide student support services network
- cost-effective programmes
- modular approach to programmes
- resource sharing, collaboration and networking with conventional Universities, Open Universities and other Institutions / Organisations
- socially and academically relevant programmes based on students' need analysis
- As a torchbearer of innovation, IGNOU integrates technology with education through initiatives like MOOCs on SWAYAM, SWAYAM PRABHA channels, and e-Gyankosh, ensuring quality education is both accessible and affordable
- With 325 programmes, including Four-Year Undergraduate Programmes (FYUP) and skill-based courses, the University continues to align with the National Education Policy 2020 to meet emerging educational and professional needs.

1.3 Important Achievements

- **No. 1 Open University** in the National Institutional Ranking Framework (NIRF)
- First Open University to receive the prestigious **A++ accreditation from NAAC**
- Ranked among the top ten "Institutes of National Importance and Central Universities" due to its endeavours to promote entrepreneurship and innovation.

- Positioned within the 151-300 range of overall rankings according to the NIRF-Innovation rating-2023.
- Emergence of IGNOU as the largest Open University in the World
- Recognition as Centre of Excellence in Distance Education by the Commonwealth of Learning (1993)
- Award of Excellence for Distance Education Materials by Commonwealth of Learning (1999)
- Launch of a series of 24 hour Educational Channels 'GyanDarshan'. IGNOU is the nodal agency for these channels and regular transmissions are done form the studio at Electronic Media Production Center (EMPC), IGNOU
- UNESCO declared IGNOU as the largest institution of higher learning in the world in 2010
- Largest network of learning support system.

1.4 The Schools of Studies

With a view to develop interdisciplinary studies, the University operates through its 21 Schools of Studies. Each School is headed by a Director who arranges to plan, supervise, develop and organise its academic programmes and courses in coordination with the School staff and different academic, administrative and service wings of the University. The emphasis is on providing a wide choice of courses at different levels.

2. MSc GEOINFORMATICS (MSCGI) PROGRAMME

The 80 credits M.Sc. Geoinformatics (MSCGI) has been developed by the School of Sciences with the help of several eminent experts across India drawn from ISRO, DRDO, IIT, C-DAC, DST and many government and private institutes/ organisations incorporating of NEP 2020 considering recent developments in the field and the need for skilled workforce. The MSCGI programme aims to provide the learners with advance theoretical knowledge and practical skills so that the learners can leverage potential of geoinformatics towards understanding natural processes, and management of natural resources, disasters, ecology and environment. It provides opportunity to learners interested in developing skills and willing to apply in their application domain. It has been designed to expose learners to fundamental and advanced theoretical principles, methods, techniques and practical applications involving advances in Remote Sensing and GIS, emerging applications in various fields, research methodology and professional skills in Geoinformatics and also computer programming for digital image processing and GIS.

Geoinformatics deals with acquisition, storage, processing and dissemination of geospatial information. Geoinformatics is an emerging field and demand for geoinformatics professionals is increasing by the day due to its application potential in several fields such as environmental monitoring and management, terrain mapping and analysis, natural resources management, natural hazards and disaster management, urban and rural planning, traffic and transport, solid waste management, site selection, business applications, geospatial education, etc. Availability of geospatial information is a must for planning of infrastructure development, social development, natural calamities, agriculture, power, water, transportation, communication, insurance, and health. Further, recent developments such as inclusion of the

subject in NET and GATE; Govt. initiatives e.g. Smart cities, SWAMITVA, AMRUT, etc. and in sectors particularly transport, logistics, supply chain management; policy changes like de-regulating geospatial data, opening of the space sector, and liberalised drone policy have tremendously increased its adoption and scope.

2.1 Background

Today, we live in an era that is characterised by technological advancements that are so dynamic that at times it goes beyond our imagination. In the rapidly changing world, geoinformatics has a special status. Use of geoinformatics for monitoring environment and human activities on the Earth's surface, with a view to improve Earth's environment began during the 1970s. The early weather images from India's own INSAT series of satellites brought the applications of space technology into the lives of the common man. While undoubtedly, we need a change in our attitudes and lifestyles to mitigate the human impact on environment, technology plays a crucial role in helping us make environmentally appropriate decisions. And, geoinformatics provide appropriate methodologies to analyse spatial information about the Earth.

Geoinformatics is considered as a synergy of various discipline Remote Sensing (RS), Photogrammetry, Cartography, Geographic Information System (GIS), Photogrammetry, Geodesy, Computer Science, Cartography and Global Navigation Satellite Systems (GNSS). The geoinformatics science and technologies have witnessed significant developments over the last few decades, which have led to widespread use of the technologies in different fields and disciplines. Geoinformatics is central to all the disciplines which use data recognised by their locations. It has now become an important tool for decision makers across a wide range of disciplines, researchers and academia and also for national survey and mapping organisations, industries, environmental agencies, and local and national governments.

With the widespread use of the geoinformatics technologies, need for professionals and researchers adept in the use of the technologies has prompted the introduction of the MSc Geoinformatics (MSCGI) Programme.

2.2 Objectives

The MSc Geoinformatics Programme is proposed with the following objectives:

- to acquaint the learners with basic and advance understanding of the underlying principles, concepts and techniques of geoinformation science,
- to provide skills in geospatial data handling, processing and analysis,
- to impart critical spatial thinking in the learners to analyse problems from a spatial perspective systematically,
- to prepare the learners to apply the principles and techniques towards finding scientific solution to problems in their application domain and communicate the findings; and
- to widen opportunities for learners for higher studies and developing career in different sectors of employment involving geoinformatics.

2.3 Expected Learning Outcomes

On successful completion, learners are expected to be able to:

- acquire basic understanding of the underlying principles, concepts, methods, advances and recent trends in geoinformatics;
- attain skills in geospatial data handling, processing and analysis;
- develop critical spatial thinking and analyse problems in their fields from spatial perspective in a systematic manner;
- explore the context of geoinformatics to be able to integrate in their work;
- apply the principles, concepts, methods, and techniques in their application domains towards finding scientific solution to problems, and
- communicate the findings.

2.4 Duration

The minimum duration of the programme is **two years,** which is divided into **four semesters**. The **maximum** period allowed for completion of the programme is **four years**.

2.5 Medium of Instruction

The medium of instruction currently is only English.

2.6 Eligibility Criteria

Candidates having the following eligibility are eligible to apply for this programme:

"Graduate in Science/ Engineering/ Technology/ Architecture/ Planning/ Computer Application/ Information Technology/ Medical & Allied Fields/ Commerce/ Business Administration/ Management"

OR

"Graduation with Geography/ Mathematics/ Statistics/ Economics/ Anthropology/ Archaeology as one of the subjects" from a recognised University".

2.7 Learner Target Group

- Defence and law enforcement personnel
- School and college/university teachers either teaching or interested in teaching geoinformation science related courses
- Working professionals possessing little or no exposure to geoinformatics but are interested to initiate and develop skills in this field, and
- Graduates from various academic backgrounds interested in acquiring basic theoretical understanding and develop practical skills on the aspects of data handling and processing to use the data in application areas of their interests.

2.8 Fee Structure

At present, the programme fee for MSCGI is Rs. 31,400.00/- for Full Programme and Rs. 15700/- per year plus Registration Fee and Development Fee as applicable. With time, the University may revise the programme fee and the revised fee shall be payable by the learners as per the

schedule of the University. You may refer to the Student Handbook and Prospectus of your academic session for recent information related to fee.

2.9 Entry and Exit Options

Learners completing PG Diploma in Geoinformatics (PGDGI) programme from IGNOU can take lateral entry directly into the second year of the MSCGI programme subject to fulfilling eligibility requirements of the MSCGI programme as per the University guidelines.

Learners exiting after successfully completing first semester courses (worth 20 credits) of the programme may opt to receive a Post-Graduate Certificate in Geoinformatics (PGCGI). And, learners exiting after successfully completing first two semester's courses (worth 40 credits) of the programme may opt to receive Post-Graduate Diploma in Geoinformatics (PGDGI). The existing PG Certificate in Geoinformatics (PGCGI) and PG Diploma in Geoinformatics (PGDGI) programmes are also on offer as stand-alone programmes separately.

Learners leaving after earning their PGDGI may take entry in the second year of MSCGI programme within the stipulated time as per the University rules and guidelines, subject to fulfilling eligibility requirements of the MSCGI programme.

2.10 Re-Registration

NOTE

Note that you have to re-register in the second year, irrespective of whether you have cleared all the Courses in your first and second semester. While the programme has a semester structure, the fee is to be paid annually. At the time of your admission, you have paid the fee for the first year (i.e. 1st and 2nd semesters). At the time of re-registration, you need to pay the fee for the second year (i.e. 3rd and 4th semesters).

Learners have to submit the Re-Registration (RR) forms for the 2nd year (comprising 3rd and 4th semester courses) 'Online' only on **https://ignou.samarth.edu.in** as per the schedule notified by the University from time to time. Timely payment of fees is the responsibility of the students. Students are expected to remit fee as early as possible without waiting for the last date. In case, you fail to remit the fee as per the schedule, you will have to wait for next cycle of fee payment schedule. Non-payment of fee results in discontinuation of the dispatch of study material. Such students will not be permitted to write the examinations. In case any student willfully appears in the examination without proper registration for course(s), the result shall not be declared.

2.11 Programme Structure

Studies in the two years MSc Geoinformatics programme are offered in both the sessions *i.e.* January and July sessions of each year. To successfully complete this programme, you will have to earn 80 credits over a period of 2 years to 4 years depending on your pace of study.

The structure of the MSCGI programme as designed by the Expert Committee is as follows:

Sl. No.	Course Code	Course Title	Course Type	Credit
SEMESTER-I				
1	MGY-101	Introduction to Geoinformatics	Theory	6
2	MGY-102	Remote Sensing and Image Interpretation	Theory	4
3	MGY-103	Global Navigation Satellite System and Geographic Information System	Theory	4
4	MGYL-104	Geoinformatics Laboratory	Lab	6
SEMESTER-II				
5	MGY-005	Techniques in Remote Sensing and Digital Image Processing	Theory	6
6	MGY-006	Spatial Analysis and Modelling	Theory	4
7	MGY-007	Applications of Geoinformatics	Theory	4
8	MGYL-008	Digital Image Processing and Spatial Analysis Laboratory	Lab	6
SEMESTER-III				
9	MGY-009	Advances in Remote Sensing and GIS	Theory	4
10	MGY-010	Computer Programming for Digital Image Processing and GIS	Theory	6
11	MGY-011	Geo-environmental Applications of Geoinformatics	Theory	4
12	MGYL-012	Advanced Geoinformatics Laboratory	Lab	6
SEMESTER-IV				
13	MGYE-021 Or MGYE-022	Emerging Applications of Geoinformatics Advanced Programming in Geoinformatics*	Theory	4
14	MGY-013	Research Methodology and Professional Skills in Geoinformatics	Theory	4
15	MGY-014	Geoinformatics in Natural Resources and Environmental Studies	Theory	4
16	MGYP-031	Dissertation/ Project Work		8
	Or Two Electives (Theory) of 4 credits each			
	MGYE-041 MGYE-042 MGYE-043	Geoinformatics in Urban Development and Planning* Geoinformatics in Disaster Studies* Geoinformatics in Coastal and Marine Studies*	Theory (any two courses to be taken)	(4+4)
		Grand Total		**80**

*The elective courses will be available as and when ready to be offered.

Details of the theory and laboratory courses are given in the Sections 3 and 4. Please note that all the courses are compulsory for all the learners irrespective of their previous educational and work experiences.

2.11.1 Theory Courses

There are theory courses in all the semesters, which are designed to provide knowledge of theory and techniques necessary for use in many application areas starting from the basic concepts to the advanced techniques and also covering numerous applications in various fields/sectors. These courses are designed to incrementally enhance your knowledge of the subjects covering various aspects. For, example, the first theory course MGY-101 will prepare you to study the second and third theory courses and the fourth practical course of the first semester. You are advised to study the theory courses in the same order.

2.11.2 Practical Courses

The MSc Geoinfomatics programme has laboratory courses of 6 credits each in the first three semesters constituting ~25% practical component of the programme. Together with the project work worth 8 credits, it constitutes ~30% of the programme. The laboratory courses are designed with practical components related to the concepts covered in theory courses of each semester of the programme. Through these courses, it is expected that learners would develop skills in various free and open-source geospatial software and packages such as QGIS, SAGA, GRASS, R, GEE, Python OpenLayers, GeoServer, PosgreSQL/PostGIS, etc.

Counselling for **practical exercises** will be held at the study centres as per the requirement of the course material.

It should be carefully noted that by taking admission in the programme you have made sure that you:

- **can come to the nearest study centre for attending practical counselling sessions and making your own arrangement during your travel and stay for the prescribed duration;**
- **have access to a computer because the practical exercises require you to carry out / perform the exercises at home prior to attending practical counselling sessions at the study centre; and**
- **have access to internet at home to download required software and data over the internet for performing the prescribed exercises.**

You are strongly advised to carry out/ perform all the exercises at home prior to coming to the study centre to attend the counselling session because number and duration of tutor guided practical sessions are limited. The limited number of hours allotted to complete the practical exercises for each session may not be sufficient for some learners to complete them in the prescribed time, if they have not carried out the same at home prior to coming to the study centre.

It is expected that after registration, it may take a learner to work for minimum ~180 hours for each of the laboratory courses, which includes the time spent on practical work and also preparation of the required practical records. The laboratory courses will require full-time

presence of the learners at the practical laboratory for the prescribed schedule/ duration. Term-end practical examination (TEPE) for the laboratory courses would be conducted on a date specified by the University across India common for all the study centers across India. Schedule for the practical work for the practical exercises of a laboratory course deemed necessary may be held either in a span of few days continuously or in two/three spans depending upon the availability of counsellors and laboratory facilities at the concerned study / programme centres.

Attending practical sessions is compulsory for each student. It should be noted that minimum **70%** attendance in the scheduled practical counselling sessions qualifies a candidate to appear for the term-end practical examination of the practical course. Students also need to submit practical records for each of the laboratory course covering answers to the questions given in each of the exercises in each laboratory course.

2.11.3 Scheme of Study

In order to enable yourself to complete MSCGI programme within the minimum period of two years you will have to study courses of all the four semesters worth 20 credits per semester in each cycle of six months commencing either in January or July session depending upon the cycle of your admission. In case, you find this scheme does not suit your pace and you would like to spend more than six months to complete courses of a semester, you may concentrate your attention only on those courses in which you intend to take the examination. You may appear for the examination of the remaining courses later within the validity period of your registration. Term End Examinations (TEE) are held in the month of June and December of each year. In this way, you can plan your studies for more than two years but not more than four years or the maximum period of validity of your registration.

With proper planning, you can complete this programme according to your convenience. However, it is strongly advised that while completing the practical course, concepts discussed and covered in the concerned theory courses should be understood first.

3. THEORY COURSES OF THE PROGRAMME

As mentioned in subsection 2.11, there are generally three theory courses and one practical course in each semester of the programme. These courses are worth 20 credits per semester with an option for project work (worth 8 credits) in the fourth semester, totaling 80 credits for the entire MSCGI programme. In this section, you will find details of the theory courses with a brief introduction of each of the theory course and their broad contents.

Details of the courses are given here semester wise.

SEMESTER-I COURSES

MGY-101: INTRODUCTION TO GEOINFORMATICS (6 Credits)

This is the first course of the programme which would introduce you to the basic concepts, components and applications of geoinformatics. The course comprises of four blocks each

touching upon an aspect of the Geoinformatics technologies. The first Block deals with overview of geoinformatics through which you would acquire understanding on the basic concepts and fundamentals of the geoinformatics and also recognise the national agencies and initiatives involved with geoinformatics related work. After discussing the basic terminologies and related concepts in the first block, Block-2 introduces the basic concepts of geospatial data and data processing tools. After studying this block you would attain understanding of basic concepts of geospatial data, sources of data, data products and formats and data analysis tools. Block-3 deals with the basics of maps, mapping, interpretation of topographical maps and also on selecting a suitable map projection. After studying the basic concepts of Geoinformatics in the first three blocks, the Block-4 provides an overview of the scope and applications of geoinformatics in different fields such as natural resources studies and management, land use and urban planning, e-governance, climate, agriculture, health, archaeology, business, environment and disaster related studies. Syllabus of this course is as follows:

Overview of Geoinformatics - Definition, components, spatial and aspatial data, products, overview of application potential; Evolution of the discipline, multidisciplinary nature, geospatial ecosystem and employment prospects; Recent Trends in remote sensing, photogrammetry and GIS, policy initiatives.

Geospatial Data - Definition, data and information, types; Sources of remote sensing images, DEMs, raster products; Sources of primary and secondary vector data, data from national mapping agencies, census data, other sources, data quality issues; Overview and comparison of various COTS and FOSS s/w, indigenous s/w, typical system configuration requirements; Overview and comparison of various relevant programming languages, typical system configuration requirements.

Basics of Mapping - Concepts of geoid, ellipsoid and datum, types of projections, coordinate systems; Definition, types of maps, scale, map elements, visual aspects, colours, placements, comparison of different map layouts, overview of data classification and display methods; International and Indian numbering systems of topographical maps, types of SOI topographical maps, projection parameters used, scale; interpretation of maps, representation and symbolisation of topographical features.

Applications of Geoinformatics - Overview of important organisations and projects, Use of geoinformatics in rural, urban and regional planning, e-governance; Role of geoinformatics in ecosystem management, links to SDG indicators, natural resources studies; Applications in agriculture, environment and climate related studies; Monitoring and management of various types of disasters; Applications in health, archaeology, humanities, social sciences, business, forensics, etc.

MGY-102: REMOTE SENSING AND IMAGE INTERPRETATION (4 Credits)

Remote sensing, defined as a science and art of acquiring information about Earth materials without coming in direct contact with them is carried out with the help of cameras/sensors mounted in the aircrafts or satellites. Through remote sensing technique we can acquire data about characteristics of the Earth in an almost continuous and two-dimensional fashion. Remote sensors are designed in such a way that they record interaction between Earth materials and electromagnetic radiation (EMR). First block of this course deals with the

principles which form basis of remote sensing. It begins with the concept and historical development of remote sensing and describes electromagnetic spectrum, properties of EMR and radiation laws. It also provides basic understanding of interaction of EMR with common Earth materials and spectral signature. Block-2 discusses remote sensing platforms and sensor systems, image resolution and major space programmes in separate units. The block provides information on the commonly used platforms and majority of the important sensors. It also discusses about image resolution. Further, it provides an overview of major space programmes of the world. Remote sensing data are analysed either in visual mode or in digital mode. Both these methods have been dealt with in the third and fourth blocks, respectively. Information derived from image interpretation is useful to explore and manage natural resources of the planet Earth. Block-3 describes elements and keys of visual image interpretation alongwith the necessity of ground truth data collection. Block-4 deals with the concepts of digital images, their processing and interpretation. It first explains the errors that occur during the imaging and with the techniques used for their rectification. Further, it discusses image enhancement and transformation techniques, image classifications and accuracy assessment each in separate units. Syllabus of this course is as follows:

Introduction to Remote Sensing - Introduction, definition, history, remote sensing process, electromagnetic energy and its properties, electromagnetic radiation models, EMS and its major divisions, radiation laws; EMR-atmosphere interaction, EMR-earth interaction; Overview of spectral properties and signatures of common earth materials such as vegetation, water, soils, minerals and rocks.

Sensors and Space Programmes - Platforms for remote sensing imagers, types of satellites and orbits, types of sensors; types of resolutions and their relationship to various applications; Overview of major space programmes of India; Overview of major global space programmes including private agencies; Satellite data procurement, types and levels of data products, image data formats.

Visual Interpretation - Aerial photo-interpretation, image interpretation, process and method, calculation of scale; Elements of aerial photo/image interpretation, interpretation keys; Sample aerial photographs /images and their interpretation; Introduction to ground truthing, need and role, planning field surveys, data collection sheet, field equipments.

Digital Image Interpretation - Types and characteristics of digital images, concept of colour composite, image histogram and its significance; Overview of digital image processing; Overview of pre-classification, classification and post-classification methods employed.

MGY-103: GLOBAL NAVIGATION SATELLITE SYSTEM AND GEOGRAPHIC INFORMATION SYSTEM (4 Credits)

This course introduces two important components of geoinformatics i.e. Global Satellite Navigation Systems (GNSS) and the Geographic Information System (GIS). GNSS have become essential part of all applications where mobility plays an important role such as in transportation systems i.e., navigation and aviation, weather forecasting, environment management, etc. The GNSS Technology has not only enhanced the ease and flexibility of spatial data acquisition but has also diversified the approaches by which it is integrated with GIS and remote sensing. GIS allows us to view, understand, question, interpret and visualise data in many ways that reveal relationships, patterns and trends in the form of maps, reports,

and charts. A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared. This course comprises 4 blocks. First block introduces the Global Navigation Satellite System (GNSS) technology and the remaining three blocks deal with the fundamental concepts of GIS. Block 1 discusses the concepts and components of GNSS, principles of their operation and sources of errors in the derived data along with an overview of its applications in various fields. Block- 2 introduces GIS and its components along with its historical developments, basics of data models, along with concept of topology and status of database management system in GIS. Block-3 deals with the methods of data input and database creation giving an account of digitisation process, data standards, methods of linking non-spatial data with spatial data and also about data conversion. The heart of the GIS i.e. spatial analysis is discussed in the Block-4 which gives an account of different types of analysis and GIS outputs. Syllabus of this course is as follows:

Global Navigation Satellite System - basic function, historical background, types, principle of operation, space, control and user segments, computation of coordinates, accuracy, differential GPS; Examples of GNSS programmes and their characteristic features, Indian programmes; Planning GNSS survey, steps for carrying out survey, overview of applications.

Fundamentals of Geographic Information System - components and elements of GIS, historical development, applications, recent trends, organisational aspects; Raster and vector data models and their comparison; Overview of data and data models in computer, vector and raster data structures, concept of database and geodatabase, DBMS.

GIS Database Creation - Existing data and its conversion, creating new data, input devices, reference frameworks, georeferencing, map digitisation, level of input; GIS data standards, topological concepts; Attribute data acquisition guidelines, data linkages, attribute data management, data integration; Quality of geospatial data, components of data quality, FAIR principles of spatial data, sources and types of errors, detecting errors, topological and non-topological editing.

Spatial Analysis and Outputs - Cartographic representation, map design, introduction to GIS data exploration, map based data manipulation, data query, spatial elements; Introduction to spatial analysis, analysis framework, overview of vector and raster data analysis, spatial interpolation, DEM; Display of analysis, cartographic and non-cartographic outputs, map generalisation and symbolisation.

SEMESTER-II COURSES

MGY-005: TECHNIQUES IN REMOTE SENSING AND DIGITAL IMAGE PROCESSING (6 Credits)

This course covers various techniques in remote sensing and digital image processing. It is built on the first semester course and takes learners further in the field. It covers various remote sensing techniques (such as aerial, multispectral, thermal, hyperspectral, microwave/ RADAR, LiDAR, UAV), image pre-classification techniques, image classification, change-detection techniques and post-classification processing, and also basics of R programming for image analysis (covering data exploration, visualisation, band math, classification, etc.). Syllabus of this course is as follows:

Remote Sensing Techniques - Aerial cameras, planning aerial photography missions, photogrammetry, types, scale and height measurements, stereoscopic measurements, area

measurement, application potential; multispectral imaging, physical principles of thermal remote sensing, thermal properties of terrain, environmental considerations, application potential, multispectral and thermal image processing software; imaging spectroscopy, hyperspectral imaging system, considerations, current and future hyperspectral remote sensing missions, application potential, image processing requirements and software; history and overview of microwave systems, physical fundamentals, passive and active microwave remote sensing, imaging radars, RADAR interferometry, GPR; application potential, data products and analysis, data processing requirements and software; LiDAR remote sensing and UAV based remote Sensing, overview of UAV platforms, its scope and application potential, data processing requirements and software.

Image Pre-classification Techniques - Introduction to univariate and multivariate image statistics; Radiometric errors and their corrections, considerations for airborne digital data; Geometric errors and their corrections, considerations for airborne digital data; Linear and non-linear image enhancement methods, applications; Types of filtering, concept of band ratioing, commonly used indices; Fusion of panchromatic, multispectral and other types of data, principle of PCA, examples and scope.

Image Classification and Change Detection Techniques - Introduction, unsupervised training, approaches; Classification scheme, training site selection, statistics extraction and signature evaluation, decision making, selection of optimum bands and appropriate algorithm, brief introduction to artificial intelligence and machine learning in image classification; Overview of change detection techniques; Accuracy assessment of thematic maps.

Introduction to R Programming - Overview of programming languages for image processing, comparison of various languages, advantages and potential of R; basics of R programming, R packages and libraries, hardware requirements; using R for basic data exploration; visualisation of panchromatic and multispectral images, creating subsets and saving outputs, extracting pixel values, image information and statistics, generating spectral profiles; using R for basic image processing: band ratios, vegetation indices, creating histograms, applying thresholding, classification, plotting data.

MGY-006: SPATIAL ANALYSIS AND MODELLING (4 Credits)

This course covers various spatial analysis and modelling techniques used in GIS. It is built on the first semester course on GIS and takes learners further in the field. It includes spatial database concepts and modelling, spatial data mining, and mathematical measures of spatial and spectral distance. You will learn more about vector and raster analysis (local, neighbourhood, zonal, distance operations), 3-D data representations and processing, network and path analysis, viewshed and watershed analysis, and multicriteria analysis for decision support. The course also covers GIS modelling fundamentals, space–time modelling and error propagation, and practical aspects of GIS project management. It also reviews GIS programming options and their scope for automating workflows and developing custom analyses. Syllabus of this course is as follows:

Basics of Spatial Analysis - Integration of RS and GIS; Concepts of spatial database and data mining, DBMs, SDBMs, database modelling; Introduction to geostatistics and techniques, spatial distance, spectral distance, exploring spatial relationships between variables, mathematical operations.

Spatial Analysis - Vector Data Analysis; Raster Data Analysis: Characteristics, local operations, neighbourhood operations, zonal operations, distance measure operations, other operations, output functions; Path analysis, types of networks, undirected and directed network analysis, applications; Vector and raster representations and processing of 3-D data, their comparison; Factors influencing and approaches of viewshed and watershed analysis, applications;: Considerations and overview of multicriteria analysis methods.

GIS Modelling, Project Management and Programming - Basic elements, models and their types, modelling surface, role and methods of interpolation; using GIS for space-time modelling, error propagation and their impact; GIS Project planning, system analysis and requirement studies, design methodology, implementation, maintenance and support, coping with uncertainty; Overview and comparison of various GIS Programming languages, scope.

MGY-007: APPLICATIONS OF GEOINFORMATICS (4 Credits)

There are various applications of geoinformatics briefly covered in the first semester course. This course covers detailed applications in various fields giving the learners an idea on the data and techniques employed for the applications discussed. The course first explains the physical basis of spectral signatures for various earth surface features such as vegetation, water, soils, minerals, rocks, landforms and LULC, and shows how those signatures enable mapping and monitoring of these features. Then various specific applications such as natural resources (including biomass, fragmentation, etc.) different climate-change indicators, hazards and disasters (covering volcanoes, earthquakes, landslides, tsunamis, cyclones, floods, droughts, glacial outbursts, and fire/pollution/oil-spill monitoring), and other sectoral uses spanning urban/rural planning, e-governance (transport, utilities, smart cities, crime mapping), agriculture (acreage, yield, precision farming, insurance), defence, telecom/site selection, transportation/navigation, archaeology, and GIS-as-a-service.are discussed separately with relevant data considerations. Syllabus of this course is as follows:

Remote Sensing of Earth Surface Features - Physical basis; factors affecting spectral signatures of vegetation, water, soils, minerals, rocks, landforms and Land Use Land Cover features.

Natural Resources Applications - Application potential in soil texture mapping, soil moisture, land degradation, erosion; mineral exploration; Application potential in forest type mapping, density mapping, biodiversity mapping and assessment, NDVI, leaf area index, introduction to above ground biomass assessment, forest fragmentation; climate change related applications.

Hazards and Disasters related Applications -:- Hazards and disasters; application potential for volcano, earthquakes, landslides and tsunami; data considerations; application potential in cyclone, flooding, drought and Glacial outburst related studies; forest and coal fire related studies; water, air and land pollution and oil spills related studies; epidemiological and public health related studies.

Other Applications - Application potential in urban, rural planning and e- governance related studies including transportation, utilities, Smart cities, crime mapping and analysis; application potential in crop area acreage estimation, crop yield, pest infestation, precision agriculture, crop insurance; etc.; defence related applications, application potential in site selection; telecom and network analysis; transportation; navigation; cultural and archaeological applications, GIS data as a service.

SEMESTER-III COURSES

MGY-009: ADVANCES IN REMOTE SENSING AND GIS (4 Credits)

This course covers advances in remote sensing data analysis and GIS, and spatial analysis with focus on techniques. It also covers the aspects related to geospatial policy and standards. It is built on the first and second semester courses and takes learners further in the field. This course covers topics such as modern data analysis trends for multispectral, hyperspectral, microwave and LiDAR data; expert and hybrid systems integrating spatio-contextual and ancillary data, Object-Based Image Analysis, and cloud-based processing and platforms (viz. Bhuvan, AWS, Google Earth Engine); advances in WebGIS, IoT, Location-Based Services, AI/ML for geospatial applications and programming approaches; and an overview of geospatial data policy, standards and national/ global initiatives shaping the geospatial ecosystem. Syllabus of this course is as follows:

Advances in Remote Sensing Data Analysis-I - Trends in Multispectral, hyperspectral, microwave, LiDAR Data Analysis: overview of techniques in preprocessing, enhancement and classification/ thematic information extraction and applications.

Advances in Remote Sensing Data Analysis-II - Need for expert systems; incorporation of spatio-contextual and ancillary information, hybrid classification, advantage and application; Object Based Image Analysis; Cloud Based Data Processing; data and software as a service, example platforms-Bhuvan, Amazon web, GEE, and their characteristics, applications.

Advances in GIS and Spatial Analysis - WebGIS and IoT, recent trends and future scope; Location Based Services, recent trends and future scope; Overview of programming languages used in customisation, methodologies for developing geospatial applications, overview of use of AI and ML in GIS, application examples; Advances in Spatial Analysis.

Geospatial Data Policy and Standards - Overview of current national map policy, relevant guidelines, acts and laws, future scope; Geospatial Data related Policies and Standards, brief background on geospatial data ecosystem in India, overview of relevant standards and various policies in India and globally, recent initiatives in the space sector.

MGY-010: COMPUTER PROGRAMMING FOR DIGITAL IMAGE PROCESSING AND GIS (6 Credits)

This course is designed with the practical components which are related to the theory courses of the third semester courses of the programme. Therefore, this course is designed to cover aspects related to computer programming covering Google Earth Engine, R and Python for handling raster and vector data and its processing. It also includes introduction to web mapping and development with map server and client-side API covering introductory use of GeoServer, OpenLayers, PostGreS/PopstgreSQL, PostGIS, etc. Syllabus of this course is as follows:

Working with Google Earth Engine (GEE) - Introduction to Google Earth Engine, importance and uses, functions, exploring GEE and its datasets, catalogue, data reading and visualisation; Raster Data Processing and Thematic Information Extraction in GEE; Visualising spectral profile, applying classification, extracting and visualising time series data, exporting; GIS Processing in GEE, computing zonal statistics, neighbourhood analysis, data conversion, brief overview of GUI development.

Handling and Processing Raster Data with R – Handling and visualisation of raster data, generating histogram and statistics; Image Preprocessing and Enhancement using R; writing algorithm for simple arithmetic transforms; writing algorithm for single and multi-band data classification and accuracy assessment.

Handling Vector Data and Analysis with R - Working with vector data, attribute management; basics of spatial operations using different functions, geometry operations, raster-vector interactions; rasterisation, vectorisation, applying interpolation techniques, deriving terrain attributes, statistical analysis; Data Plotting, making maps.

Data Analysis Using Python, Web Mapping and Managing Database - introduction, overview of useful libraries, using python for spatial data exploration, processing and analysis; overview of GIS programming, useful libraries and customisation of GDAL/OGR in Python; introduction to Web mapping and development with map server i.e. GeoServer and client side API i.e. OpenLayers; introduction to PostGIS and PostGreSQL, concept of spatial relational databases, understanding and handling transactions and queries, managing security.

MGY-011: GEOENVIRONMENTAL APPLICATIONS OF GEOINFORMATICS (4 Credits)

There are various applications of geoinformatics briefly covered in the first semester course and in some detail for select application areas in the second semester. This course covers detailed applications in the field of geoinformatics covering geosciences, inland water, soil, coastal, marine, environment and ecological applications with focus on the data and techniques employed for the applications discussed and recent developments. Syllabus of the course is as follows:

Geosciences Applications - Overview of landform mapping, digital terrain analysis, mineralogical and lithological mapping and exploration, mapping geological structures, considerations of data and methods, recent developments.

Inland Water and Soil related Applications - overview of inland water mapping and quality related Studies, watershed mapping and related applications, groundwater related applications, land degradation studies, considerations of data and methods, recent developments.

Coastal/Marine Applications - Overview of mapping coastal habitats, ecosystems, environment and MPA; coastal hazards and vulnerability assessment; overview of underlying principles in extraction of coastal/ marine biophysical parameters such as SSC, Chl-a, SST, PFZ, etc., considerations of data and methods, recent developments.

Environmental and Ecological Applications - overview of underlying principles in extraction of atmospheric parameters; overview of mapping urban sprawl, LST and UHIs; mapping terrestrial and aquatic habitats; overview of ecological modelling and applications including corridor analysis, species niche modeling, carbon credits, etc.

SEMESTER-IV COURSES

MGYE-021: EMERGING APPLICATIONS IN GEOINFORMATICS (4 Credits)

There are various applications of geoinformatics covered in the first, second and third semester courses. This course covers emerging applications of geoinformatics in several fields covering water resources, geosciences, biodiversity and ecology, and several other areas such as

forensic and crime, epidemiology and health, climate change and cadastral studies. Syllabus of the course is as follows:

Water Resources, Agriculture and Soil related Applications - Overview of emerging applications in water resources, agriculture, and soil studies, data considerations, scope.

Geosciences Applications - Overview of emerging applications in digital terrain analysis, geological hazards, mineral exploration, planetary studies, data considerations, and scope.

Biodiversity and Ecological Applications - Overview of emerging applications in vegetation, ecological, global and regional scale studies, data considerations, and scope.

Other Emerging Application Areas - Overview of emerging applications in forensic and crime, epidemiology and health, climate change and cadastral studies, data considerations and availability, and scope.

MGY-013: RESEARCH METHODOLOGY AND PROFESSIONAL SKILLS IN GEOINFORMATICS (4 Credits)

The course introduces learners with the research methodology and professional skills with focus on geoinformatics. It gives an overview of research in the field of geoinformatics, along with imparting knowledge on several skills required such as technical writing and communication besides giving an overview of research ethics. You will also learn about job search, professional ethics, team work, and resolution of conflict of interests, which are very important in today's time. Syllabus of the course is as follows:

Overview of Research in Geoinformatics - Introduction, types, methods, overview of RS and GIS based research, steps in research process, research framework and research design; formulating research problem, hypothesis-types and testing; selection of appropriate data and methods for mapping, monitoring, time series analysis and site suitability studies; selecting appropriate method for data processing, interpretation and validation.

Technical Writing and Research Ethics - Writing a proposal, managing references; overview of various funding agencies; overview of how to manage project/dissertation, selecting suitable platform for publication, impact factor, citation index, overview of platforms such as ResearchGate, Academia, Google Scholar; overview of professional writing skills; history of copyright, evolution of copyright law in India, economic, moral and other such rights, plagiarism and use of plagiarism detection s/w, types of authorship, ethical considerations.

Communication Skills - Overview of communication, difference between conversation and other speech events, public speaking, overview of social media platforms, communicating in social media, social media etiquettes; group discussion and meetings skills, types of meeting, criteria for successful meetings; importance of body language, structure of presentation, visual aids, ending the presentation, teaching skills, managing classrooms, evaluation and assessment.

Job Search, Professional Ethics and Team Work - Job application and facing interviews; professional ethics, team work and interpersonal skills, importance of teamwork, collaborating in a team, responsibilities as a team member, collaboration and cooperation, EQ at work, speaking up, being aware of company policies, accepting and overcoming mistakes during work; role and traits of a successful leader, building team at workplace, getting the tasks done, concerns and resolutions of conflict of interests; organisational management.

MGY-014: GEOINFORMATICS IN NATURAL RESOURCES AND ENVIRONMENTAL STUDIES (4 Credits)

This course explores natural resources, environmental management, and sustainable development, with emphasis on India. It introduces biodiversity and resource issues, principles of sustainability, and modern geoinformatics applications for monitoring and managing land, water, soil, minerals, and ecosystems. Syllabus of the course is as follows:

Introduction to Natural Resources - Overview of Natural Resources: resource, its types and natural resources of India, current status and major issues, NRM; overview of status and issues in physical resources with reference to India; overview of status and issues in biotic resources with reference to India, introduction to biodiversity, biomes, biodiversity hotspots and landscape ecology, overview of methods of biodiversity assessment and identification of biodiversity hotspots.

Introduction to Environment Management and Sustainable Development - concept of environment, introduction to environmental management and its functions, management of land, water bodies and water channels, forests and wildlife, minerals; principles of environmental management; introduction to sustainable development, environmental, economical and social dimensions of sustainability, overview of sustainable development models; sustainability and development challenges.

Applications of Geoinformatics in Natural Resources Studies - Overview of application in natural resources inventory, monitoring and management, land use studies with emphasis on natural resources, water and soil resources assessment and management, mineral resources exploration and management.

Applications of Geoinformatics in Environmental Studies - Overview of application in environmental assessment and monitoring; landscape and habitat dynamics, forest ecosystem and fire studies.

Electives:

MGYE-041: GEOINFORMATICS IN URBAN DEVELOPMENT AND PLANNING (4 Credits)

This course examines urban development and planning in India, addressing urbanisation, key challenges, and sustainable solutions. It highlights geoinformatics applications for urban analysis, infrastructure mapping, and smart city development. Syllabus of the course is as follows:

Introduction to Urban Development – Meaning, causes of urbanisation and urban problems, sustainable urban development; theories; phases of urbanisation in India, challenges.

Introduction to Urban Planning - Meaning, need and importance, types of plan, master plan and its deficiencies, techniques for urban planning; urban land use planning, processes and steps, principles, key legislations, nature, scope, and structure of city, challenges and measures for development of peri urban areas; planning for the city region.

Challenges and Issues in Urban Development and Planning - Overview of challenges and issues in urban housing, industrialisation, land market, etc.; overview of issues in water and sanitation, waste management, transport, communication and traffic management, energy management urban health care, urban education, urban safety and security; overview of urban policy perspectives and urban development programmes in India,

Applications of Geoinformatics for Urban Environment - Overview of application potential of geoinformatics in urban area analysis, urban resources, services and facilities analysis; infrastructure and utilities mapping, urban services, etc.; smart cities: concept, importance, overview of applications of geospatial information and geoinformatics for smart cities, GIS framework.

MGYE-042: GEOINFORMATICS IN DISASTER STUDIES (4 Credits)

This course introduces hazards and disasters, their impacts, and human responses, alongside frameworks for disaster management in India and globally. It emphasizes risk assessment and vulnerability analysis for geological, hydrological, and man-made hazards, preparing learners to understand, evaluate, and mitigate disaster risks effectively. Syllabus of the course is as follows:

Introduction to Hazards and Disasters - overview of hazards and disasters, dimensions, types, social, economic and environmental impacts, concept of risk and vulnerability, human intervention and response, international strategies; types and causes of geological hazards - earthquakes, volcanoes, mass-movement, distribution, impact on life, property and environment, types and causes of hydrological hazards – cyclones, hurricanes, typhoons, tsunamis, floods and droughts; overview of man-made hazards: famine, drought, epidemic, wildfires, armed conflicts, chemical and biological hazards, civil strife.

Introduction to Disaster Management - overview of disaster management, disaster management Act, India 2005, Sendai Framework for DRR, disaster preparedness for people and infrastructure, key components of disaster preparedness framework, roles and responsibilities of various agencies; concept, phases of disaster management, mitigation and risk reduction steps, emerging trends, UN draft resolution, international decade for NDR, policy for disaster reduction, strategies; disaster management in India.

Risk Assessment and Vulnerability - fundamentals of risk and vulnerability, overview of risk analysis techniques, risks and vulnerability assessment for geological and hydrological hazards, linking hazard risk with vulnerability assessment, likelihood and consequences, risk and vulnerability assessment for hazards, qualitative, quantitative and semi-quantitative risk assessment.

Applications of Geoinformatics in Disaster Studies - overview of potential of geoinformatics in disaster preparedness, damage assessment and disaster response, risk and vulnerability analysis; Geoinformatics in earthquake and volcanic hazards related studies, landslide mapping and monitoring, landslide hazard analysis; hydrological biological disasters.

4. PRACTICAL COURSES OF THE PROGRAMME

Practical courses are an integral component of any science programme. Geoinformatics being an application-oriented subject, three separate practical courses worth 6 credits each for the first three semesters have been specially designed for this programme. Details of the practical courses are given here.

MGYL-104: GEOINFORMATICS LABORATORY (6 Credits)

While developing it we have assumed that you have already studied MGY-101, MGY- 102 and MGY-103. Therefore, you must study this course only after you have read the blocks of MGY-101, MGY-102 and MGY-103. This course is designed with the practical components related to the theory courses of the programme. Therefore, this course is designed in three parts *i.e.* practical related to data creation, remote sensing data handling, spatial analysis, and map composition. Exercises for the practical course are grouped under the following:

Familiarisation with Map and Software: Getting familiar with SOI topographical maps; Getting started with ISRO's Bhuvan; Working with ISRO's Bhuvan; Getting started with Google Earth; Working with Google Earth; Getting started with Quantum GIS; Data visualisation in QGIS; Downloading satellite remote sensing data; Generation of colour composites.

Data Input from Existing Data: Georeferencing; digitization and editing; attribute data linkage; data query.

Image Interpretation: Aerial photo interpretation; Generation of histogram and spectral profiles; Visual image interpretation; Creation of polygon vector data and editing; Downloading and working with digital topographic data; Generating a band ratio image; Multicriteria analysis; Map composition.

MGYL-008: DIGITAL IMAGE PROCESSING AND SPATIAL ANALYSIS LABORATORY (6 Credits)

While developing it we have assumed that you have already studied theory courses of the first and second semester and also completed the first semester laboratory course. Therefore, you must study and practice this course only after you have studied and completed the first seven courses and acquired the required theoretical understanding and developed the hands-on skills. This course is designed with the practical components which are related to the theory courses of the first two semester courses of the programme. Therefore, this course is designed to cover aspects related to data creation, digital image processing and analysis, spatial analysis including LiDAR data processing. Exercises for the practical course are grouped under the following:

Digital Image Processing: Getting familiar with SAGA and GRASS; Georeferencing a satellite image; Image enhancement; Image transformation; Unsupervised image classification; Generating training sets for supervised image classification; Supervised image classification; Post-classification processing; Ground truthing: Field data collection; Accuracy assessment; Getting familiar with R package; Data exploration using R; Creating band ratios using R; Thresholding and classification using R.

Spatial Analysis: Attribute query and retrieval; Proximity and connectivity analysis; Overlay analysis; DEM creation; Getting familiar with LiDAR data processing; Working with LiDAR data; Change analysis.

MGYL-012: ADVANCED GEOINFORMATICS LABORATORY (6 Credits)

While developing it we have assumed that you have already studied theory courses of the first, second and third semester and also completed the first and second semester laboratory courses. Therefore, you must study and practice this course only after you have studied and

completed the first eleven courses and acquired the required theoretical understanding and developed the hands-on skills.

This course is designed with the practical components which are specifically related to the theory courses of the third semester courses of the programme. Therefore, this course is designed to cover aspects related to computer programming covering Google Earth Engine, R, Python, and also the use of GeoServer, OpenLayers, PostGreS, etc. Exercises for the practical course are grouped under the following:

Google Earth Engine: Getting Familiar with GEE; Data Exploration in GEE; Data Processing in GEE.

Data Analysis with R and Python: Image Enhancement and Transformation with R; Image Classification with R; Vector Data Exploration with R; Handling DEM Data with R; Getting Familiar with Python Programming for Spatial Data; Raster Data Processing with Python; Image Classification with Python; Vector Data Exploration and Processing with Python; GIS Customisation using Python.

GeoServer, OpenLayers and PostGres: Getting familiar and working with GeoServer, OpenLayers, PostGres.

Case studies.

5. PROJECT WORK / DISSERTATION

There is a project work/ dissertation worth 8 credits in the fourth semester of your MSCGI programme. You need to first identify the topics of your research work, find a supervisor for that and then prepare your project synopsis in consultation with him/her and send for approval to the concerned at the address given in the project manual. After approval of the synopsis complete your research work as per the set objectives and incorporating the inputs/suggestions given on your synopsis. After completing the project work, submit the project report/dissertation to the address as given in the project manual available at **https://egyankosh.ac.in/handle/123456789/109913**.

6. LEARNER SUPPORT CENTRES (LSCs) / STUDY CENTRE (SC)

To provide effective student support, few Study Centres have been set up for this programme in different regions of the country. You will be allotted one of these Study Centres taking into consideration your place of residence or work. However, each centre can handle only a limited number of students hence you may be assigned to a nearby Study Centre depending upon the seat availability. The particulars regarding the Study Centres to which you are assigned will be communicated to you. List of programme study centres is given in the IGNOU Samarth Admission portal under the programme information page and is also available to choose from while filling admission form. These study centres are administratively coordinated by Regional Centres. Please note that there may be change in the list of active study centre, which can be confirmed from the concerned Regional Centre or the Regional Services Division. You can get list of Regional Centres from IGNOU website.

Each Study Centre will have the following:

- A Coordinator who will coordinate all the activities, academic as well as administrative, related to the programme and will be a guide / support to you at the centre
- Counsellors in different courses to provide counselling and guidance to you in that course
- A laboratory where you can carry out the geoinformatics practicals.

A study centre has six major functions as given here:

- Tutorial / Counselling for both the theory and laboratory courses
- Evaluation of Assignments, if any
- Library Facility
- Information and Advice
- Audio-Video Facilities, wherever available
- Interaction with Fellow Students.

7. INSTRUCTIONAL APPROACH

The methodology of instruction in Indira Gandhi National Open University (IGNOU) is different from that in the conventional universities. The Open University system is more learner-oriented, and the student has to be an active participant in the teaching-learning process. The MSCGI programme's instructional system includes self-learning materials, assignment, counselling sessions, practical work at the study centres and practical records. The University follows a multi-channel approach for instruction. It comprises a suitable mix of the following:

- self-instructional printed material
- audio and video cassettes
- audio-video programmes transmitted through Radio and Doordarshan
- counselling at Study Centers by academic counsellors
- web based support
- assignments
- practicals, *etc.*

7.1 Credit System

The University follows the '*Credit System*' for most of its programmes. Each credit in our system is equivalent to ~30 hours of student study time, comprising all learning activities (*i.e.* reading and understanding the print material, listening to audio, watching video, attending counselling sessions, teleconferencing, EduSat, Interactive Radio Counselling (IRC) and assignment, etc.). Thus, a four-credit course, for instance, involves ~120 study hours. The course weightage is expressed in terms of credits. This helps the student to understand the academic effort one has to put into successfully complete a course.

Successful completion of the programme requires successful completion of both assignments and the Term-End Examination (TEE) of theory courses, and also practical records and Term End Practical Examination (TEPE) of laboratory courses of the programme. For Project Work/ Dissertation, thesis/ dissertation and viva-voce components would be required to be completed separately.

7.2 Print Material

Printed materials are the primary form of instructional materials. For all the theory courses of the programme, you will be receiving printed study materials in the form of volumes/booklets, if you have opted for hard copies of them while taking admission except for the laboratory courses, which will be available in soft copy only irrespective of your choice /option of hard or soft copies. The material prepared by us is properly planned and self instructional in nature. Lessons, which are called 'units' are structured to facilitate self-study. The printed material is delivered to you by hand or post as decided by the University.

The **printed self-learning materials (SLMs) is generally sent to you by registered post to the address provided by you in the application form at the time of admission**. The material is despatched to you semester/annual wise as per the University policy. You can check status of dispatch of study materials on the IGNOU website using the web link: www.ignou.ac.in/ignou/aboutignou/division/mpdd/material provided by Material Production and Distribution Division (MPDD) of the University. For non-receipt of SLMs, students are required to write to the Registrar, Material Production and Distribution Division, IGNOU, Maidan Garhi, New Delhi –110 067 or e-mail to mpdd@ignou.ac.in.

The soft copy of the self-learning materials can be downloaded from eGyankosh (at https://egyankosh.ac.in) and also from IGNOU E-Content mobile App.

7.3 Audio-Video Material

The audio and video programmes are supplementary to the print material, meant for clarification and enhancement of understanding. At present, only limited video programmes on different aspects of geoinformatics are available in web page of IGNOU SOS or EMPC in www.youtube.com. You can also find them in eGyankosh portal (www.egyankosh.ac.in). There are other A/V programmes, which are under development. In future too, there will be development of A/V programmes based on the need and feedback from our learners. You can also take help of the recorded videos which are available in youtube or Google Drive, links to which may be provided to you later by your study centre or the Programme Team.

7.4 IGNOU e-Content Mobile App

IGNOU-e-Content Mobile App is an official mobile app of the Indira Gandhi National Open University (IGNOU), New Delhi. This app is an ICT initiative of IGNOU to provide Digital Learning Environment to IGNOU learners and extending Technology Enhanced Learner Support Services to them. The aim of this initiative is to disseminate the digitised course material to IGNOU Learners. IGNOU learners can use this app to access their course material through their hand-held devices such as Mobile Phones and Tablets. It can be downloaded from Google Play Store.

7.5 Teleconference (TC)

Teleconference (TC) / web conference, using one-way video and two-way audio transmission via satellite, is another medium used by the University to impart instruction to and facilitate learning for a distance learner. Schedule for the teleconferencing sessions are available on the

website of the University at (https://www.ignou.ac.in/pages/192#Schedules) or the Regional Centres. You can also watch it live on youtube at https://www.youtube.com/@EMPCIGNOU/

7.6 Interactive Radio Counselling (IRC)

Schedule of the interactive phone-in radio counselling sessions conducted by the University are available at https://www.ignou.ac.in/pages/192#Schedules and Gyan Vani FM station. The interactive radio counselling (IRC) sessions are broadcast 'live' and are relayed by stations across the country. Now, there is a synchronised weekly transmission "IGNOU HOUR" on Sundays from 4.00 p.m. to 5.00 p.m. with coverage of almost all over the country.IRC sessions can be accessed through radio at the frequency 105.6 MHz, through DTH and also through Internet at the link http://gd.ignouonline.ac.in/gyandhara/. The phone numbers for interaction are: 01129533581, 01129536131 and 29533103.

7.7 Gyan Darshan

Gyan Darshan is the 24 hours educational TV channel, which is a joint venture of IGNOU with Doordarshan. It is available through the Cable TV network. The telecast schedule of Gyan Darshan is made available on IGNOU web site at https://www.ignou.ac.in/pages/192#Schedules and/ or http://gd.ignouonline.ac.in/gyandarshan

You may ask your cable operator to provide this channel, if you have not subscribed it already.

7.8 Counselling Sessions

In distance education, most of your learning is to be done by you studying on your own hence, direct contact between the learners and their tutors / counsellors is relatively less. However, it is an important activity. The purpose of such a contact is to answer some of your questions and clarify your doubts which may not be possible through anyother means of communication. It is also intended to provide an opportunity for peer interaction. There are experienced academic counsellors at the Study Centres to provide counselling and guidance to you in the courses that you have chosen for study.

Generally, the counselling sessions are held at the Study Centres during week-ends **(*i.e.* Saturdays and Sundays).** However, it may be held on week days too depending upon availability of counsellors and other factors. Detailed schedule of counselling sessions for each of the courses will be available at your study Centre. Although attending theory counselling sessions is not compulsory, we recommend that you attend them regularly. These sessions may be very useful in certain respects such as: to share your views on the subject with teachers and fellow participants, comprehend some of the complex ideas or difficult issues, and get clarifications for many doubts which you would not otherwise try to raise.

You should note that the counselling sessions will be very different from the classroom teaching or lectures. Counsellors will not be delivering lectures as in the conventional teaching. They will try to help you to overcome difficulties which you face while studying the programme. In these sessions, you must try to resolve your subject based difficulties and any other related problem.

And, for that you should have studied the concerned Units/Blocks and performed relevant exercises prior to attending the counselling sessions.

Theory Counselling

As mentioned earlier, generally, there will be four counselling sessions each of ~2.5 hours for a 4-credit theory course or as per the relevant norms of the University. The Programme Facilitator of your Programme Centre, will inform you about the schedule. Learners are also advised to be in touch with their concerned Study Centre and Regional Centre. Counsellors will be available at each study centre according to a schedule provided by the Study Centre Coordinator. Leaners are advised to be in constant touch with their respective study center for any update with regard to induction programme and schedule of the counseling sessions. The counsellor is there to facilitate the learner's self-study. Thus, if there is an issue/ problem that a learner faces while studying, s/he can ask the counsellor for help in sorting it out. It may be noted that the counsellor will not give lectures. The counselling sessions for theory courses are not compulsory; however, it is recommended that you attend these sessions to clear doubts in the courses, if you have any.

Practical Counselling

Practical Counselling is normally conducted at the concerned study centre. **However, the University is not bound to do so and reserves the right to conduct the counselling at any study centre other than yours in case the situation so warrants due to administrative or any other reasons.**

The practical counselling sessions for the laboratory courses is generally conducted at the Learner Support Centres (LSCs), in the Computer or relevant Laboratory. You should bear in mind that 70% **attendance** in the counselling sessions of practical courses is **compulsory** for all the learners**.** It qualifies you to appear for the **Term End Practical Examination (TEPE)** for the laboratory course which is held later on a common date for all the learners across India. Schedule for practical counselling sessions will be made available to you by your LSC/RC.

Every practical session is evaluated and is included for final evaluation, the weightage being 70%. These practicals are called the **Tutor Guided practicals** or **Guided practicals.** Hence, a student has to successfully perform all the exercises/ experiments and prepare

practical records as per the practical manual in order to be able to secure good marks. The remaining 30% evaluation will be assigned for the **Term End Practical Examination (TEPE)** to be performed by the students on a specific date throughout India. These practical exams are conducted generally in the months of July or January for June and December TEE, respectively and are to be performed without the assistance of a counsellor. Date sheet for the TEPE is made available in advance by the University in its website.

You are strongly advised to complete the laboratory courses in the same semesters to which they belong to because the practical manual may be revised with time keeping in view the changes/ upgradation in the software/ data/ techniques being used.

Please note the following:

i) **Since conduct of practical counselling sessions involves good amount of time for background work and also cost factor, practical counselling session(s) already scheduled may not be conducted, if minimum required number of learners are not present to attend the session(s).**

ii) **Each practical exercise is generally of 4 hours duration, however, some of the exercises could be of 2 hours duration depending upon the tasks involved.**

iii) **About two sessions of four hours each or equivalent is generally held each day depending upon the prescribed duration of the practical exercises.**

iv) **If part of a practical remains incomplete in a scheduled day for some reason, the remaining part should be completed in the next day.**

v) **Some duration of the first session of the practical counselling may also be utilised as introductory session.**

Please keep in touch with the Coordinator/ Programme-in-charge of your study centre to know schedule of the Practical counselling sessions.

7.9 Student Support Services

In order to provide individualised support to its learners the university has set a few numbers of Study Centres throughout the country for the programme. These are administratively coordinated by the Regional Centres.

The Study Centres are the contact points for the participants on all major aspects of the programme. These include counselling sessions, practical. The Study Centres are also equipped with some useful books on the subjects of this programmes these may be accessible to the participants during their visits to the Centre. **The University may not always be able to communicate to all the students individually. All the important communications are sent to the Regional Directors.** The Coordinator(s) of your study centre would display a copy of such important circulars / notifications on the notice board of the Study Centre for the benefit of all the students. You are, therefore, advised to keep in touch with your Study Centre Coordinator on a more or less regular basis so as to get advance information about assignments, submission schedule (assignments and examination forms), list of students admitted to a particular examination, declaration of result, etc.

"The candidates are required to opt only such Study Centre as is activated for the programme. As far as possible, the University will allot the Study Centre opted by the candidate. However, the University may change the study Centre due to administrative reasons without concurrence of the student at any time."

NOTE

Before going to attend the counselling sessions, please study your self-learning materials (SLMs) and make a plan of the points to be discussed. Unless you have gone through the units or practiced the exercises yourself, there may not be much for you to discuss.

7.10 Study Plan

As mentioned earlier, printed materials are the primary form of instructional materials. The learners joining open and distance learning institutions like IGNOU are expected to be self-learners. As there is no regular and face-to-face classroom teaching in such institutions, you are provided **self-learning materials (SLMs)** for the courses of the programme which are developed in self-instructional style and completely cover the course contents. The self-learning materials are specially designed and developed by in-house faculty along with a team of experts drawn from different institutions and universities all over the country. These materials are edited by content experts and language experts before they are finally printed. Effort is made by the programme team to make SLMs self-contained so that you do not need any additional help to understand it. Since, SLMs for the courses are the primary learning resource, you should know how these SLMs are structured and how you can make best out of it.

The SLMs are supplied to the learners in the form of several volumes/booklets. Each course is generally packaged into two volumes. And, each course generally contains three to four blocks. Each block, comprises several units. The first page of each Course/Volume/Block indicates the numbers and titles of the Blocks/Units comprising the block. In the first block of each course, we start with course introduction and/or volume introduction which is followed by a brief introduction to the block giving their expected learning outcomes.

Please read the Course/Volume Introduction and the Block Introduction first carefully as these will give you an overview of the Course / Volume and the Blocks.

Each unit begins with an introduction in which we tell you about the contents of the unit. We also outline a list of objectives/expected learning outcomes which we expect you to achieve after study/working through the units. This is followed by the main body of the unit, which is divided into various sections and sub-sections. We end each unit by summarising its contents. In each unit, there are several Self-Assessment Questions (SAQs) and Terminal Questions (TQs). These are meant to help you to assess your understanding of the subject contents.

Here are some advices for you on how to study the SLMs for the courses of the programme:

- Always keep a pen/pencil and paper with you while studying so that you can mark or note important points.
- Use the course as your notebook. The margins given in each page is for you to make use of. **Make notes in the text as well as in the margin.**
- Work out the Self Assessment Questions (SAQs), Terminal Questions (TQs) on separate papers, as no space has been provided in the text for this purpose.
- We advise you to make an honest attempt at solving the SAQs and the Terminal Questions. Do not immediately turn to the answers given at the end of each unit, if you cannot solve a problem in the first instance. You should go through the unit once more and then attempt the questions again.
- Match your answers of the SAQs and TQs to the indicative answers given at the end of each unit.

Your actual study time for a unit will, of course, depend on your academic background and work experience in a relevant field. Learning and grasping level also varies from one learner to another.

7.11 Web Based Support

The learners can have access to IGNOU's website at the address (www.ignou.ac.in)

This website provides relevant information to the general public and student support facilities to the learners through the Single Window Information and Student Support (SWISS). These include the following, wherever relevant and available:

Downloadable prospectus / application forms of various programmes

MPDD: Material Dispatch Status (https://gradecard.ignou.ac.in/mpddstatus/Jan25/StudentMaterialStatus.aspx)

Catalogue of audio/ video programmes (https://www.youtube.com/user/ignousos)

Schedule of GyanDarshan / GyanVani / EDUSAT programmes (https://www.youtube.com/@EMPCIGNOU)

IGNOU Admission SAMARTH portal (https://ignouadmission.samarth.edu.in)

Downloading of Student ID card (https://ignou.samarth.edu.in)

Regional Services Division (https://www.ignou.ac.in/pages/181)

Addresses of IGNOU Regional Centres and Study Centres (https://www.ignou.ac.in/pages/22)

Student Service Centre (SSC) (https://www.ignou.ac.in/pages/196#ContactUs)

Student Services (https://www.ignou.ac.in/pages/4)

Announcements / Update on the latest happenings at the University (https://www.ignou.ac.in/pages/6)

Student Portal (https://ignou.samarth.edu.in/index.php/site/login)

After confirmation of admission, please visit the website of your respective Regional Centre for Induction Meetings, academic counselling schedules and other academic support.

Downloading of assignment (https://www.ignou.ac.in/studentService/download/assignments)

Online submission of Term-End Examination Form (https://admission.ignou.ac.in/Default.aspx)

Previous Year Question Papers (https://www.ignou.ac.in/pages/221) or (https://webservices.ignou.ac.in/Pre-Question)

TEE date-sheet (https://www.ignou.ac.in/viewFile/SED/notification)

Examination Hall Ticket (https://hall_ticket.ignou.ac.in)

Results of the term End Examinations/ Reevaluation (https://termendresult.ignou.ac.in or https://www.ignou.ac.in/pages/60)

Grade Card (https://gradecard.ignou.ac.in/gradecard/login.aspx or https://www.ignou.ac.in/pages/60)

Important Contact Details related to Student Evaluation Division (https://www.ignou.ac.in/pages/182#ContactUs)

Link to Online Re-Registration (https://onlinerr.ignou.ac.in/)

Alumni Portal (https://ignoualumni.samarth.edu.in)

8. EVALUATION

The evaluation of the performance of the students in each theory course will be based on two components: (i) continuous evaluation through one assignment, and (ii) term- end examination (TEE) for theory courses. **You must pass both in the continuous assessment/ evaluation component as well as in the term-end examination (TEE) of a course to earn the credits assigned to that course.** In the final result, the assignment in each course carries 30% weightage while 70% weightage is given for the term-end examination.

You are required to score at least 40% marks separately in the continuous evaluation (assignment) and the term-end examination for each course. In the overall computation also, you must get at least 40**% marks** in each component of each of the courses to earn the certification/degree.

The laboratory courses would also be evaluated based on two aspects: (i) continuous assessment/ evaluation of tutor guided practicals, and (ii) term-end practical examination (TEPE) (*i.e.* unguided practical). Continuous evaluation of practicals is done at the concerned programme study centre under the guidance of counsellors. Continuous assessment/ evaluation of the laboratory exercises (including the practical records) carries a weightage of 70%. Evaluation of performance in the Term-end practical examination (TEPE) carries a weightage of 30% for the course. Schedule of term- end practical examination (called *date sheet*) is displayed/ published in the IGNOU portal in advance. You must get the print out of the output of practical related to each exercise checked and signed by your counsellor and maintain a file (called Practical Record Book) of the signed practicals. This file (Practical Record Book) will be a part of your continuous assessment and you will be required to submit it to your study centre/ exam center.

Qualifying Marks: The minimum qualifying score in both continuous evaluation (assignments) and term-end examination is 40% mark in each course. If you fail to score at least 40**%** in the TEE of any course, you can appear in the subsequent TEE for that course up to two years, the period for which your registration is valid.

Overall Grading: The final score for each course is computed by combining continuous evaluation score and term-and examination score.

The University follows grading system for continuous evaluation as well as term-end examination. The evaluators are required to award numerical marks in assignments, practical, projects and term-end examination which are converted into five grades according to the weightage shown against each letter grade on a five point scale. The notional correlates of the letter grades and percentage of marks are as follows:

Division	Percentage of Marks
Ist Division	≥ 60%
IInd Division	≥ 50% but less than 60%
IIIrd Division	≥ 40% but less than 50%
Fail	Below 40%

A student will be declared **successful if he/she scores at least 40% in theory and practical courses, separately in each of the components**.

8.1 Assignments

Tutor Marked Assignments (TMA) are **compulsory** component of the theory courses. You will need to do one tutor marked assignment for each theory course. There are no assignments for the laboratory courses of the programme, for which there are practical records to be made. **Each assignment is valid for the dates given on the assignment. If you fail in an assignment or are not able to submit the assignment before the validity date, you have to submit the assignment for the next year. Make sure that the assignment is valid on the date you are planning to submit it.**

The TMA for each semester can be downloaded from the Student Zone of the University website (new assignment portal) at https://www.ignou.ac.in/studentService/download/assignments

Assignments constitute the continuous evaluation/ assessment component of the theory courses. The marks that you get in your assignments carry 30% weightage and will be counted in your final result. Therefore, you are advised to take your assignments seriously.

There will be one assignment for each theory course. You have to complete the assignments in time. Detailed instructions are given in the assignment booklets.

Assignment submission deadlines are generally as follows:

Cycle	Course	Deadline
January	Theory	March 31st of the same year*
July	Theory	September 30th of the same year*

*or as notified by the University

Note that you will not be allowed to appear for the term-end examination for a course, if you do not submit the assignment for the course within the deadline mentioned here or as specified by the University. If you appear in the term-end examination of a course without submitting its assignment, the result of the term-end examination is liable to be cancelled/ withheld.

The main purpose of assignments is to test your comprehension of the self-learning material you receive from us. Whenever you receive a set of assignments, check them immediately and ask for missing pages, if any, from the concerned Regional Director or the Coordinator of your Study Centre. The assignment responses should be complete in all respects. Before

submission, you should ensure that you have answered all the questions in all assignments. Incomplete answer sheets will result in poor grades.

The University/ Coordinator of the Study Centre has the right to reject the assignments received after the due date. You are, therefore, advised to submit the assignments before the due date.

For your own record, retain a copy of all the assignment responses which you submit to the Coordinator of your Study Centre. If you do not get back your duly evaluated tutor marked assignments along with a copy of assessment sheet containing comments on your assignments by the evaluator within a month after submission, please try to get it from your study centre personally. This may help you to improve upon your future assignments.

Generally, the University sends SLMs, wherever relevant to the students by registered post and if you do not receive the same for any reason whatsoever, the University shall not be held responsible for that. In case you want to obtain a copy of the assignments, you can download it from the IGNOU website: https://www.ignou.ac.in/studentService/download/assignments

8.2 Term-End Examination

The term-end examination (TEE) for each 4 credit and 6 credit course is of 50 marks and 100 marks, respectively and of two hours and three hours duration, respectively. To be eligible to appear in the Term-end Examination (TEE) of any course, you are required to fulfill the following conditions:

a) You should have opted and pursued the prescribed programme and course
b) You should have submitted the examination form in time along with the requisite fees
c) Your registration for the programme should be valid, and
d) Maximum time to pursue the programme is not elapsed.

For this programme, candidate may appear in the Term-end examination after the six months of registration. For example, if a candidate is registered for the programme in the January cycle then he/she is eligible to appear in the term-end examination of the first semester courses to be held in the month of June TEE of the same year. Similarly, if a candidate is registered for the programme in the July cycle then he/she is eligible to appear in the term-end examination of the first semester courses to be held in December TEE of the same year. Similarly, for second semester course after one year and likewise for the courses of other semesters.

It is being repeated here that University conducts term-end examinations twice a year in **June and December.** Examination date schedule (called **Date Sheet**) indicating the date and time of examination for each course is displayed/ published in the IGNOU website and also sent to all the Regional Centres/ Study/Exam Centers in advance.

8.3 Issue of Examination Hall Ticket

University issues Examination Hall Ticket to the students at least two weeks before the commencement of Term-end Examination and it could also be downloaded from the University's website **www.ignou.ac.in.** In case you fail to receive the Examination Hall Ticket

within one week before the commencement of the examination, you can download the hall ticket from the website and approach the exam centre for appearing in the exam.

Your study centre is normally your examination centre. Your enrollment number is your Roll Number for examinations. Be careful in writing it. Any mistake in writing the Roll Number will result in non-declaration of your result.

It is your duty to check whether you are registered for that course and whether you are eligible to appear for that examination or not. If you neglect this and take the examination without being eligible for it, your result will be cancelled.

Although all efforts are made to declare the result in time, there may be times when the University cannot declare the results of the last examination before commencement of the next examination. You are, therefore, advised to fill up the form without waiting for the result.

Note that your Programme Study Centre is the contact point for you**.** The University cannot send communications to all the students individually. All the important communications are sent to the Facilitators of the Study/Programme Centres. The facilitators would display a copy of such important circular / notification on the notice boards of the Programme Study Centre for the benefitof all the students. You are, therefore, advised to get in touch with your Facilitator for day-to-day happenings so as to get advance information about assignments, submission of examination forms, date-sheet, list of students admitted to a particular examination, declaration of result, etc.

If you have missed any term-end examination of a course for any reason, or failed in the examination, you may appear in the subsequent term-end examination. This facility will be available until you secure the minimum pass grade but only up to a period of validity from the date of registration of the first semester. **There is no provision to reappear in an examination of any course for improvement.**

While communicating with the University regarding examinations or any other matter, please clearly write your name, name of the programme, enrollment number, Regional Centre, Study Centre and complete address. In the absence of such details, the University maynot be able to attend to your problems.

8.4 Early Declaration of Result

If you have got offer of admission for higher study and or selected for employment, etc. and are required to produce statement of marks / grade cards by a specified given date, you may apply for early processing of your answer script and declaration of result. You are required to apply in prescribed application form with requisite fee per course by means of demand draft drawn in favour of IGNOU and payable at New Delhi alongwith attested photocopy of offer of admission / employment. You can submit your request for early declaration before the commencement of the term-end examination i.e. before 1st June and 1st December, respectively. The University, in such cases, will make arrangement for early processing of answer scripts and declare the result as a special case possibly within a month time from the date of conduct of examination.

Please note that early declaration of result is permissible in term-end examinations only and not in Practical/ Laboratory courses, Project, Assignment, etc.

8.5 Re-evaluation of Answer Script(s)

If you are not satisfied with the marks/grade awarded to you in Term-end Examination you may apply for re-evaluation before 31st March for result of December term-end examination and 30th September for result of June term-end examination or within one month from the date of declaration of results, whichever is earlier on payment of requisite fee per course by means of demand draft drawn in favour of IGNOU and payable at New Delhi in the prescribed application form. The better of the two scores of original marks/grade and marks/grades after re-evaluation will be considered and updated in student's record.

Please note that Re-evaluation is permissible in term-end examination only and not in Practicals/ Lab courses, Project, Workshop, Assignment and Seminar, etc.

A sample prescribed application form with rules and regulations is available at University's website.

8.6 Obtaining Photocopy of the Answer Script(s)

Learners may obtain the photocopy of the evaluated answer scripts for the term-end examination on request. They may generally apply in the prescribed application form from 1st September to 15th October for June Term-end Examination and from 1st March to 15th April for December Term-end Examination alongwith the prescribed fee per course by means of demand draft drawn in favour of 'IGNOU' and payable at 'New Delhi'. A sample application form with rules and regulations is available at University's website.

8.7 Issue of Official Transcript

The students may also obtain 'Official Transcript' for submission to the Overseas or Indian Institutes/Universities on request. They may apply in the prescribed form by paying the requisite fee by means of demand draft in favour of 'IGNOU' and payable at 'New Delhi'. A sample application form with rules and regulations is available at University's website.

8.8 Examination for Laboratory Courses

Evaluation of laboratory courses is carried out at the time of conducting the laboratory courses at the study centre. Each and every experiment, which you perform, is evaluated. Evaluation of experiments, which you perform under the guidance of your counsellor, constitutes continuous evaluation and carries 70% weightage. On the other hand, the evaluation of unguided experiment(s), which you perform during the term end practical examination, carries 30% weightage and constitutes Term End evaluation. The TEPE also has a viva-voce component.

9. OTHER USEFUL INFORMATION

9.1 Refund of Fee

Refund of fee is governed by the Fee Refund Policy of the University as given on the University Admission Portal (https://ignouadmission.samarth.edu.in). Fee paid for one programme is not adjustable against any other programme of the University. In case the University denies

admission, the programme fee will be refunded after deduction of registration fee, through online mode.

9.2 Reservation

The University provides reservation of seats for Scheduled Castes, Scheduled Tribes, Non-Creamy Layer of OBC, Economically Weaker Sections, War Widows, Kashmiri Migrants and Physically Handicapped learners, as per the Government of India rules, for admission to its various programmes. However, submission of forged certificate under any category shall be liable for not only cancellation of admission but also to be legally implicated as per Government of India rules.

9.3 Scholarships and Reimbursement of Fee

Reserved Categories, viz., Scheduled Castes, Scheduled Tribes and Physically Handicapped learners, etc. have to pay the fee at the time of admission to the University along with other learners. Physically Handicapped learners admitted to IGNOU are eligible for Government of India scholarships. They are advised to collect scholarship forms from the respective State Government Directorate of Social Welfare or Office of the Social Welfare Officer and submit the filled-in forms to them through the Regional Director of IGNOU concerned. Similarly, SC/ST learners have to submit their scholarship forms to the respective State Directorate of Social Welfare or Office of the Social Welfare Officer, through the Regional Director of IGNOU concerned for suitable reimbursement.

The Application for reimbursement of Programme Fee to SC/ST learners can be downloaded from the link:
http://ignou.ac.in/userfiles/Application%20form%20for%20Reimbursement%20of%20fee.pdf

SC/ST learners who are availing any kind of fellowship or fee exemption from other agencies are not eligible for fee exemption under SCSP/TSP scheme. The exemption of fee is confined to the Programme Fee mentioned in the Admission Prospectus. The scheme will not exempt late fee, term-end-exam fee, convocation fee, etc. Eligible and interested learners may contact the Regional Centre concerned. Details of the scheme and notification are uploaded on www.ignou.ac.in

Detail information regarding the Fee Exemption for SC/ST Learners under the SCSP and TSP Schemes may be obtained from the link: http://www.ignou.ac.in/userfiles/Joint%20Notification%20of%20SCSP%20TSP.pdf

Eligible students can apply for Government of India scholarship on the National Scholarship Portal (**https://scholarships.gov.in/**) after confirmation of their admission. For more information in this regard, please see the IGNOU admission portal.

9.4 Correction of Address and Study Centre /Regional Centre Change

Learners can initiate the request for change of address, Learner Support Centre and Regional Centre online from their user account. The user account is to be created at

https://ignou.samarth.edu in by clicking 'New Registration. They can also make a request to the Regional Centre.

When a learner wants transfer from one region to another, he/she has to write to that effect to the Regional Centre from where he/she is seeking a transfer marking copies to the Regional Centre where he/she would like to be transferred to. Further, he/she has to obtain a certificate from the coordinator of the learner support centre from where he/she is seeking transfer regarding the number of assignments submitted. The Regional Director from where the learner is seeking the transfer will transfer all records including details of fee payment to the new Regional Centre under intimation to the Registrar, Student RegistrationDivision (SRD) and the learner as well. For change of 'Region' in practical oriented Programmes, '**No Objection Certificate**' is to be obtained from the concerned Regional Centre/Study Centre where the learner wishes his/her transfer.

In case any learner is keen for transfer from Army/Navy/ Air Force Regional Centre to any other Regional Centre of the University during the cycle/session, he/she would have to pay the fee-share money to the Regional Centre. In case the learner seeks transfer at the beginning of the session/cycle, the required programme course fee for the session/cycle shall be deposited at the Regional Centre. However, the transfer shall be subject to availability of seats, wherever applicable.

The learner can seek transfer to any other study centre only after six months of Registration or submission of first year/semester assignments for the programme of one year or longer duration or as per the existing University policy.

9.5 Correction/Change of Name/Surname of Learner

Mistakes, if any, such as in the spelling, committed at the time of data entry stage will be rectified at the Regional Centre. In case there is a change in the name (other than the one mentioned in his/her High School Certificate), then it is mandatory to furnish legal evidence of having changed his/her name/ surname while submitting the admission form.

For 'Change of Name/Surname', after confirmation of admission, the learners are required to submit the following documents at the Regional Centre:

a) Original copy of Notification in a daily newspaper notifying the change of name;

b) Affidavit, in original, on non-judicial Stamp Paper of the appropriate value sworn in before 1st Class Magistrate specifying the change in the name;

c) Marriage Card/ Marriage Certificate in case of women candidates for change in surname;

d) Gazette Notification, in original, reflecting the change of name/ surname; and

e) The requisite fee.

Request for correction and/or change of Name / Surname will be entertained only before completion of the programme.

9.6 Disputes on Admission and Other University Matters

The place of jurisdiction of filing of suit, if necessary, will be New Delhi/Delhi ONLY.

9.7 Prevention of Malpractice/Notice for General Public

Learners seeking admission to various academic programmes of Indira Gandhi National Open University are advised to directly contact IGNOU headquarters at New Delhi or Regional Centres of IGNOU only. Learners interacting with intermediaries shall do so at their own risk and cost. However, in case of any specific complaint regarding fraudulent institutions, fleecing learners, etc., please contact the University through the **Email:** ignouregistrar@ignou.ac.in or any of the following members of the Malpractices Prevention Committee:

1. Director, SSC (Tele: 29535714)
2. Director, RSD (Tele: 2953 2118, 29572412)
3. Registrar, SED (Tele: 2953 5828, 29572204)
4. Registrar, SRD (Tele: 2953 2741, 9571302)
5. Registrar, MPDD (Tele: 29534521, 29572002)
6. Deputy Registrar, F&A (Tele: 29534934)

Alternatively, complaints may be faxed on 29532312.

Note: Except the above-mentioned complaints, no other queries will be entertained at the above phone numbers.

As per directions of Hon'ble Supreme Court of India ragging is prohibited. If any incident of ragging comes to the notice of the authority the concerned learner shall be given liberty to explain and if his explanation is not found satisfactory, authority would expel him from the University. IGNOU admissions are made strictly on the basis of merit. Only those learners who satisfy the eligibility criteria fixed by the university will be admitted. Learners will not be admitted if they are not eligible as per the eligibility criteria. Therefore, the candidates should not be misled by the false promises of admission made by any private individuals or institution.

Always keep a copy of your correspondence with the university, such as assignment, etc. with you.

Please mention your complete details along with name, name of programme, enrollment number, study centre, regional centre on all the correspondence you make with the University.

9.8 Placement Services

In order to further extend learner support services to its geographically distributed learner population who are pursuing various IT and Non-IT related Degree, Diploma and Masters Programme, the university has established the Campus Placement Cell (CPC). The mission and endeavour of CPC is to enhance and facilitate the process of prospective suitable employment opportunities that are commensurate with the personal profiles of our learners. All learners interested in seeking the assistance of CPC for procuring suitable job opportunities are requested to send their current resume/bio-data to campusplacement@ignou.ac.in.

They are further advised to visit IGNOU website for regular updates on placement related activities.

9.9 Incomplete and Late Application

Incomplete application forms/ Re-registration forms, received after due date or having wrong options of courses or electives or fast information, will be summarily rejected without any intimation to the learners. You are, therefore, advised to fill the relevant columns carefully and enclose the copies of all required certificates duly attested by a Gazetted Officer. **The form is to be submitted to the Regional Director concerned ONLY on or before the due date.** The applications form sent to other offices of the University will not be considered and the application will have no claim whatsoever on account of this.

9.10 Some Useful Contact Addresses

1.	Identity Card, Fee Receipt, Bonafide Certificate, Migration Certificate, Scholarship forms, Change of Courses / Electives / Opting of left over electives/	Concerned Regional Centre. The demand Draft for the requisite should be drawn in favour of 'IGNOU' payable at city of the Regional Centre.
3.	Schedule/Information regarding Exam-form, Entrance Test, Date-sheet, Hall Ticket	Asst. Registrar (Exam. II), SED, Block-12, Room No. 02, IGNOU, Maidan Garhi, New Delhi-110068. Ph.: 011-29536743, 29572202, 29572209
4.	Result, Re-evaluation, Grade Card. Provisional Certificate, Early Declaration of Result, Transcript	Deputy Registrar (Exam.III), SED, Block-12, Room No. 01, IGNOU, Maidan Garhi, New Delhi-110068. Ph.: 011-29536103, 29572201, 29571316
5.	Non-reflection of Assignment Grades/ marks	Assistant Registrar (Assignment), SED, Block-03, IGNOU, Maidan Garhi, New Delhi-110068. assignment@ignou.ac.in. Ph.: 011-29571312, 29571319, 29571325
6.	Deletion of excess credits/Project query after submission	Asst. Registrar (Project), SED, Block-03, IGNOU, Maidan Garhi, New Delhi-110068, Ph. 29571312
7.	Original Degree/Diploma/ verification of degree/diploma	Deputy Registrar (Exam. I), SED, Block-9, IGNOU, Maidan Garhi, New Delhi-110068. Ph.: 011-29535438, 29572224, 29572213
8.	Student Grievance (SED)	Asst. Registrar (Student Grievance), SED, Block-3, Room No.13, IGNOU, Maidan Garhi, New Delhi-110068. Ph.: 011-29532294, 29571313
9.	Academic Content	Director, School of Sciences, IGNOU, Maidan Garhi, New Delhi-110068. sos@ignou.ac.in. Ph.: 011-29532167; 29572832
10.	Student Support Services	Regional Director, Student Service Centre, IGNOU, Maidan Garhi, New Delhi-110068. ssc@ignou.ac.in, Ph.: 011-29535714, 29533869,2953380, Fax: 011-29533129

10. LINKS TO SOME USEFUL FORMS

In this section, we are listing the relevant links to IGNOU website for various forms, which could be useful to you. Whenever you have to correspond with the university, please download the form from the IGNOU website, fill it carefully and send it as per the instructions given in the form. The detailed instructions for all these forms are provided in the form itself. Some of these links may change, in that case please use the search option to find the desired link. An

important page for all students is: http://ignou.ac.in/ignou/studentzone or your login in IGNOU website.

Note: You may download the Forms from the IGNOU Website

1. **Assignment related links**

   Link to Latest Assignment(s):
   https://www.ignou.ac.in/studentService/download/assignments

2. **Re-registration**

   Link to Online Re-Registration https://onlinerr.ignou.ac.in/

Last date of Re-Registration is announced on the IGNOU website. In general, the re- registration is to be done 2-3 months prior to the start of Session. For example, the last date of re-registration for the session starting from July cycle is typically the end of May. Similarly, the last date for session starting January cycle may be in the last of November. You must verify the cut off dates and fees from the website prior to filling up form.

3. **Term-end Examination and Related Links**

   The link to the **online Term End Examination form** is available on
   https://exam.ignou.ac.in/

   Links to application forms for

   - Early Declaration of Result
   - Obtaining Photocopy of the Answer Script
   - Re-evaluation of Answer script
   - Duplicate Grade Card/Mark-sheet
   - Issue of Official Transcript

   are all available on: http://ignou.ac.in/ignou/studentzone/forms/1

   The form for **the Issue of Migration Certificate** is available at

   http://ignou.ac.in/ignou/studentzone/download/Applicationformc

Please regularly check the **News and Announcements** section of the IGNOU website for all important announcements regarding admissions, assignment submission dates, term-end examination schedules and re-registration.

4. **Other Important Links**

   Link for Checking Study Material Dispatch Status
   http://www.ignou.ac.in/ignou/aboutignou/division/mpdd/material

   Link to online Term End Examination form https://exam.ignou.ac.in

   Link to form for Early Declaration of Result
   http://www.ignou.ac.in/userfiles/APPLICATION%20FORM%20FOR%20EARLY%20DECLARATION%20OF%20RESULT%20OF%20TERMEND%20EXAMINATION.pdf

   Link to Application Form for Obtaining Photocopy of the Answer Script
   http://www.ignou.ac.in/userfiles/Application%20form%20for%20Reevaluation%20of%20Answer%20Scripts(1).pdf

Link to form for Re-evaluation of Answer script
http://www.ignou.ac.in/userfiles/Application%20form%20for%20Reevaluation%20of%20Answer%20Scripts(1).pdf

Link to Application form for Improvement of Division/Class
http://www.ignou.ac.in/userfiles/Improvement%20form.pdf

Link to form for Duplicate Grade Card/Mark-sheet
http://www.ignou.ac.in/userfiles/Duplicate%20mark%20sheet%20form.pdf

Link to form for Issue of Official Transcript
http://www.ignou.ac.in/userfiles/Official%20Transcript%20form.pdf

Link to form for Issue of Migration Certificate
http://ignou.ac.in/userfiles/Migration%20Certificate.pdf