

PROGRAMME GUIDE

**M.Sc. (MATHEMATICS WITH APPLICATIONS IN
COMPUTER SCIENCE)
M.Sc. (MACS)**

Core and Elective Courses



**School of Sciences
Indira Gandhi National Open University
New Delhi-110068**

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Further information on Indira Gandhi National Open University courses may be obtained from the University's office at Maidan Garhi, New Delhi-110 068.

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IGNOU

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SCHOOL OF SCIENCES

Dear Learner,

We welcome you to the Indira Gandhi National Open University (IGNOU). We compliment you for joining M.Sc. (Mathematics with Applications in Computer Science), which is a unique programme of its kind in the Country. The aim of this programme is to familiarise you with some important applications of mathematics in computer science.

We are sure you will make all sincere efforts to complete this programme and benefit from it. While doing this programme this programme guide will be an important source of information regarding various aspects of the programme like registering for various courses, filling up examination forms, non-receipt of study material, etc.

We strongly recommend that you read this Programme Guide carefully. We hope you will enjoy studying the courses of the programme.

Wishing you all the best,

Yours Sincerely,

Programme Team Members of M.Sc. (MACS)

IGNOU

Maidan Garhi

New Delhi – 110 068

1. ABOUT THE UNIVERSITY

1.1 Introduction

Indira Gandhi National Open University came into being on September 20, 1985, by an Act of Parliament to achieve the following objectives:

- democratising higher education by taking education to your doorsteps;
- providing access to high quality education to all those who seek it irrespective of age, region or formal qualifications;
- offering need-based academic programmes by giving professional and vocational orientation to the courses;
- Promoting and developing distance education in India.

1.2 Special Features

- International jurisdiction.
- Nation wide student support service network.
- Cost effective programmes.
- Modular approach to programmes.
- Socially and academically relevant programmes based on students need analysis.
- Relaxed entry regulations.
- Study according to your own pace and convenience.

1.3 The Schools of Studies

With a view to develop interdisciplinary studies, the University operates through Schools of Studies. Each School is headed by a Director who plans, supervises, develops and organizes its academic programmes and courses in coordination with the School staff and the different academic, administrative and service wings of the University. The emphasis is on providing a wide choice of courses at different levels. The Schools of Studies currently in operation are as follows:

- School of Computer & Information Sciences
- School of Continuing Education
- School of Education
- School of Engineering & Technology
- School of Health Sciences
- School of Humanities
- School of Management Studies
- School of Sciences
- School of Social Sciences
- School of Agriculture
- School of Law
- School of Journalism and New Media Studies
- School of Gender and Development Studies

- School of Tourism Hospitality Service Sectoral Management
- School of Interdisciplinary and Trans-disciplinary Studies
- School of Social Work
- School of Vocational Education and Training
- School of Extension and Development Studies
- School of Foreign Languages
- School of Translation Studies and Training
- School of Performing and Visual Arts

1.4 Instructional Approach

The methodology of instruction in this university is different from that of the conventional universities. The Open University System is more learner-oriented, and the learner is an active participant in the teaching-learning process. Most of the instruction is imparted through distance mode rather than face-to-face communication.

The University follows a multi-media approach for instruction. It consists of:

- Self-instructional material in the form of printed material and wrap-around material
- Audio-visual material
- Counselling sessions/contact programmes

1.5 Course Preparation

Print materials are specially designed and developed as self-learning materials 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 and dispatched to the study centres.

1.6 Credit System

The University follows the “Credit System” for most of its programmes. The course weightage is expressed in terms of credits. 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 doing the self check exercises therein, attending counselling sessions and writing assignment responses). A four-credit course, for instance, involves 120 study hours. This helps you to understand the academic effort you need to put in to successfully complete a course.

1.7 Support Services

In order to provide individualised support to you, the University has a large number of Programme Study Centre throughout the country. At the Programme Study Centres, you would interact with the Academic Counsellors and your peer groups, refer to books in the library, watch/listen to video/audio cassettes and interact with the coordinator on administrative and academic matters. The support services are also provided through work centres, programme centres, skill development centres and special study centres.

1.8 Counselling Sessions

According to the course design, most of your learning is to be done by you studying on your own. However, you may need help at various times. For this we provide face-to-face contact between you and your tutors/counsellors. Although attending theory counselling sessions is not compulsory, we recommend that you attend them regularly. By attending these counselling sessions, you can meet your academic

counsellors and your fellow students. This will help you to discuss the course material and clarify any doubts you may have in the course from your academic counsellor or fellow students. You will also get a realistic idea of the level of accomplishment that is expected of you by talking to your fellow students. The detailed schedule of the counselling sessions for each of the courses will be available at your Programme Study Centre.

Face-to-face counselling will be provided to you at the programme study centre assigned to you. You should note that the counselling sessions will be very different from the usual classroom teaching or lectures. Counsellors will **not** give lectures on the course contents. They will try to help you to overcome difficulties (academic as well as personal) which you face while studying for the programme. In these sessions you must concentrate on the subject-based difficulties and any other issue arising out of such difficulties.

1.9 IGNOU Website

The IGNOU website is <http://www.ignou.ac.in>. The following useful information is available at this site.

- Details of programmes on offer.
- Application forms of various programmes.
- Address checking.
- Assignment of current years.
- Term-end examination date-sheet.
- Catalogue of audio/video programmes.
- Hall ticket details.
- Result and Grade Card of your term-end examinations.
- Previous years question papers.
- An update on the latest happenings at the University.

2. M.Sc (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)

Programme Code: M.Sc (MACS)

This unique programme emphasises on the courses which have vast potential for applications in the areas such as computer science, economics, biology, etc. It offers an exciting opportunity to people who are interested in mathematics and who wish to understand how mathematics can be put to practical use. It discusses modelling and solving real world problems in the contexts of computer applications. In fact, these applications have become essential even in undergraduate education for all students, including those preparing to be scientists, engineers, technicians, teachers and leaders in business and government organisations.

Objectives of the Programme

This programme has the following broad objectives:

- to emphasise the relevance and usefulness of mathematics from an application point of view;
- to equip the learners with the core mathematical knowledge and training necessary for use in many application areas;
- to expose the learner to real-life problems and promote the use of mathematics in industry and applied sciences;
- to develop human resource in emerging disciplines such as Mathematical Biology, Computational Mathematics, etc.

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**.

Medium of Instruction

The programme is available only in English.

Eligibility

1. A graduate with a Major/Honours in Mathematics with at least 50% marks in aggregate.

If the seats at a centre remain vacant then

2. Graduates with a BA/B.Sc. degree with Mathematics as one of the three main subjects with equal weightage, having at least 50% in aggregate, and 55% in aggregate in the Mathematics courses, will be considered for admission.

Reservation

IGNOU provides reservation according to the reservation policies of the Government of India.

Admission

Admission will be on the basis of merit. Initially, you have to apply for the programme, paying only the registration fee. The merit list will be displayed in the webpage of the concerned Regional Centre. You will also get a letter from the Regional Director if you are selected. You can pay the fees for the first semester after this.

Programme Fee

After your admission to the programme is confirmed and you take admission to the programme, you have to pay the programme fee[§] of Rs.5600/- in the first semester which includes registration fee of Rs.100/. For the second, third and fourth semesters, the programme fee is Rs.5500/- per semester. Programme fee will be paid at the time of re-registration in the beginning of each semester, only by way of Demand Draft drawn in favour of IGNOU, New Delhi.

The details for the submission of re-registration form are given below:

Sl. No.	January Session	Late Fee	July Session	Late Fee
1.	1 st Aug. to 1 st Oct.	Without late fee	1 st Feb. to 31 st March	Without late fee
2.	3 rd Oct. to 31 st Oct.	Rs.200/-	1 st April to 30 th April	Rs.200/-
3.	1 st Nov. to 30 th Nov.	Rs.500/-	1 st May to 31 st May	Rs.500/-
4.	1 st Dec. to 20 th Dec.	Rs.1000/-	1 st June to 20 th June	Rs.1000/-

Submission of forms at Sl. No. 1 to 4 above for Jan./July session will be at **Regional Centre** concerned.

Sample re-registration forms in this regard are given as Form No.9-11 in the programme guide. **Please note that you have to register for the next semester, irrespective of whether you have cleared all the papers in your previous semester.**

2.1 M.Sc. (MACS) Programme Structure

Studies in this 2 year programme are divided into **4 semesters (2 semesters per year)**. The **first semester** is from **January to June** and **second semester** is from **July to December** of each year. To successfully complete this programme, you will have to earn **64 credits** over a period of 2 to 4 years depending on your convenience. However, you will **not be allowed to earn more than 16 credits** in a semester. These 64 credits comprise

1.	Core Courses	34 credits
2.	Elective Courses	26 credits
3.	Project	4 credits
	Total	64 credits

The details of these courses are given in Secs.5 and 6. After successfully completing the programme you will be awarded the **degree of M.Sc (Mathematics with Applications in Computer Science)**.

Core Courses

The core courses are designed to provide mathematical knowledge and techniques, necessary for use in many application areas. These core courses, which you will be studying during the first two semesters of your studies, will prepare you well to study the courses offered during the third and the fourth semesters. We have given the pre-requisite, qualifications needed (if any) for the courses, along with their syllabus in Sec. 5.

Elective Courses

The elective courses will expose you to the applications of mathematics in the area of computer sciences. The details of these courses are given in Sec. 6.

[§] The Programme fee is subject to change

Project

Project work is **compulsory** for every learner. It aims to provide you with an opportunity to undertake hands-on work in some Industry/Organizations/R&D establishment/Institution. The Project Guide that is sent to you along with the fourth semester material will give you all the details related to the project work.

2.2 Instructional System

The M.Sc. (MACS) programme instructional system includes self-instructional print material, wrap-around material, assignments, counselling sessions, project and practical work at the programme study centres.

Print Material

For some of the courses of the programme, you will be receiving printed study material in the form of booklets called blocks. The print material is properly planned and is self-instructional in nature. Lessons, which are called units, are structured to facilitate self-study. The **printed material is sent to you by registered post to your residence.**

Wrap-around Material

The wrap-around material, or **study guide**, for some of the courses of the programme has been developed around a textbook prescribed for the course. The design and format of the study guide is like any other printed block of IGNOU. This guide is an aid in studying and understanding the prescribed chapters of the book. It clearly indicates what and how much to study from the book.

A study guide consists of number of units. Each unit is further divided into sections and sub-sections. In each section of the unit we have clearly indicated in a box in bold letters the particular chapter/section of the textbook to be studied at that time. We have also indicated the exercises you have to do in a box. Typically a box would be of the form:

Read Sec.11, Chapter-2 of the book from pages 33-35.

Do the exercises 4, 5, 7, 8 on pages 42, 43 of the book.

Remember that instructions in the second box above does not restrict you from trying other exercises given in the textbook.

Wherever we felt that more explanation is needed for understanding the text given in the book, we have given them in the unit just below the respective box clearly indicating the theorem number/equation number/page number, to which we are referring to. In addition to this we have given a number of solved examples/exercises in the units in order to enhance your understanding of various concepts.

The study guide **along with the textbook** is sent to you by registered post to your residence along with the other printed material. While studying wrap-around courses, you must keep both the book and the guide in front of you.

Assignments

Assignments are a **compulsory** component of the course. Assignments are sent to you along with the other printed material by post. They can also be downloaded from the IGNOU website. You will need to do one tutor marked assignment for each theory course. Courses with practical components have practical assignments also. For such courses assignments may contain a mix of both theory and practical exercises or, the two assignments may be separate or, practical assignment may be attached to the blocks in the print material.

If you fail in an assignment or couldn't submit the assignment before the due date, you have to submit the assignment for the next year.

The main purpose of the assignments is to test your comprehension of the learning material you receive from us and also to identify the gaps in your understanding of the course by providing feedback to you. These assignments will be checked by your counsellors, who will also explain to you where and how you can improve your understanding. The information given in the printed course material should be sufficient for answering the assignments. However, to take you a little further, you can always refer to other books accessible to you.

These assignments are to be submitted at the programme study centre according to the submission schedule provided in the assignments booklets. Before submission, you should ensure that you have answered all the questions in all assignments. Incomplete answer sheets bring you poor grades.

The period of validity is given in the instructions for students in the second page of the assignment. You will not be allowed to appear for the term-end examination for a course if you have not submitted the assignments in time for that course. If you appear in term-end examination without submitting the assignments, then the result of term-end examination is liable to be cancelled.

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

SPECIFIC INSTRUCTIONS FOR TUTOR MARKED ASSIGNMENTS

1. Write your Enrolment Number, Name, Full Address, Signature and Date on the top right hand corner of the first page of your response sheet.
2. Write the Programme Title, Course Code, Course Title, Assignment Code and Name of your Programme Study Centre on the left hand corner of the first page of your response sheet. Course Code and Assignment Code may be reproduced from the Assignment. The top of the first page of your response sheet for each assignment should be like this:

	ENROLMENT NO:
PROGRAMME TITLE :	NAME :
	ADDRESS :
COURSE CODE :
COURSE TITLE :
ASSIGNMENT CODE :	SIGNATURE:
PROGRAMME STUDY CENTRE :	DATE :

3. Read the assignments carefully and follow the specific instructions, if any, given in the assignment itself.
4. Use only foolscap size paper for your responses and tie all the pages carefully. Avoid using very thin paper. Allow a 4 cm. margin on the left and at least 4 lines in between each answer. This may facilitate the evaluator to write useful comments on the margin at appropriate places.
5. Write the response in your own hand. Do not print or type the answers.

6. Do not copy your assignment response from other students or from the internet. You can discuss the assignment questions with your fellow students or refer to other sources, but you have to present the answers in your own language. If you are caught copying, your assignment will be rejected.
7. Write assignment for each course separately. Do not write the assignments in continuity.
8. Write the question number with each answer.
9. **The completed assignments should be sent to the Facilitator/Assistant Coordinator of the Programme Study Centre allotted to you. Under no circumstances you should send the tutor marked response sheets to the Students Registration & Evaluation Division at Headquarters for evaluation.**

Project Work

The aim of the Project work, worth 4 credits, is to provide the learners with an opportunity to undertake hands-on work in some industry/organisation/R&D establishments/institution. To help you, a detailed project guide is sent to you along with other print material in which different steps involved in doing a project are given, along with detailed examples. The Programme Facilitator at your centre will also help you in tying up with some industry/organization/institute, etc. in your region for doing the project work.

Practical Work

Nine out of seventeen courses of study of the programme have a computer practical component. Computer practicals will be held at the Programme Centres. Attending practical sessions is **compulsory** for each student. The total number of practical sessions per semester ranges between 11 to 36. These sessions are spread over the entire semester. Completing 70% of the sessions is compulsory in the practical sessions of a course. It qualifies you to appear for the term-end practical exam of the course. Schedule for practical sessions will be provided to you by the Programme Facilitator of your centre. In some of the courses, practical assignments are given separately whereas, for some they are printed at the end of the units in the block. Please do your assignments independently and do not forget to read the instructions regarding the practical work given in the practical manual or the printed blocks of the course material.

Programme Study Centres

To provide effective students support, we have set up seven programme study centres for this programme in seven locations, namely Noida, Cochin, Ranchi, Jabalpur, Kolkata, Chennai and Pune. . The list of M.Sc. (MACS) programme centres, along with their addresses, is given on page 63 of the programme guide. You will be allotted one of these programme study centres. However, each programme study centre can handle only a limited number of students. The particulars regarding the programme study centre to which you are assigned will be communicated to you at the time of admission.

Each Programme Study Centre will have:

- A Programme **facilitator/Assistant 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, core as well as electives, to provide you counselling and guidance in that subject.
- **Project supervisors** to guide you in selecting and executing your project work and supervise the progress from time to time.
- A **computer laboratory** where you can do your computer practicals.
- A **library** where you can refer to the books suggested for supplementary reading in different subject areas as well as view audio-video materials, if any, related to the programme.

A Programme Study Centre has the following functions:

- i) **Tutorial/Counselling:** Programme study centres conduct face to face contact-cum-counselling for both the theory and practical component of courses. Generally there will be 5 theory counselling sessions for a 4-credit course and 3 to 4 sessions for a 2-credit course.

Programme Facilitator/Assistant Coordinator will provide you the schedule of the contact-cum-counselling sessions for both theory and practical. In these sessions you will get an opportunity to discuss with the Counsellors your problems pertaining to the courses of your study.
- ii) **Evaluation of Assignments:** The evaluation of your Tutor Marked Assignments (TMAs) will be done by the Counsellors at the Programme Study Centre. The evaluated assignments will be returned to you by the Programme Facilitator/Assistant Coordinator of your Programme Centre with tutor comments and marks obtained in TMA. These comments will help you in your further studies while preparing for your examinations.
- iii) **Interaction with fellow-students:** In the Programme Study Centre you will have an opportunity to interact with fellow students. This may lead to the formation of self-help groups.

2.3 Scheme of Study

In order to enable you to complete your M.Sc (MACS) programme within the minimum period of two years, you will have to take 16 credits worth of courses in each of the four semesters. Registration to the programme is semester-wise. After the first/second/third semester, irrespective of whether you pass or not in all the courses of the semester, you must re-register for the second/third/fourth semester courses respectively, by submitting the Course Re-registration Form with the requisite programme fee. The course re-registration form for second/fourth, and third semesters, respectively, are given as Forms No. 9, 10 and 11, respectively.

It is quite possible that you cannot find sufficient time to prepare for the Term End Examinations of all the 16 credits worth of courses you have registered for in a particular semester. You can focus only on those courses in which you intend to take the examination. You can give the examination of the remaining courses later. Examinations are held in the month of June/December of each year. In this way, you can plan your courses for more than two but not more than four years. By a proper planning every year, you can complete this programme according to your convenience. The **semester-wise details of the courses of M.Sc (MACS) programme** is as follows: (The courses with a practical component are marked with a *)

First Semester

S. No	Course Code (Tentative)	Title of the Course	Credits	Type of Material Available
1.	MMT-001	Programming & Data Structures *	4	Print (4 Blocks)
2.	MMT-002	Linear Algebra	2	Print (2 Blocks)
3.	MMT-004	Real Analysis	4	Print (3 Blocks)
4.	MMT-005	Complex Analysis	2	Wrap-around (Text Book + Printed Study Guide)
5.	MMT-007	Differential Equations and Numerical Solutions *	4	Print (4 Blocks)

Second Semester

S. No	Course Code (Tentative)	Title of the Course	Credits	Type of Material Available
6.	MMT-003	Algebra	4	Wrap-around (Text Book + Study Guide 1 and 2.)

7.	MMT-006	Functional Analysis	4	Wrap-around (Text book + Study Guide)
8.	MMT-008	Probability and Statistics *	8	Print (8 Blocks)

Third Semester

S. No	Course Code (Tentative)	Title of the Course	Credits	Type of Material Available
9.	MMT-009	Mathematical Modelling *	2	Print (2 Blocks)
10.	MMTE-001	Graph Theory *	4	Wrap-around (Text Book + Study Guides 1 and 2.)
11.	MMTE-002	Design & Analysis of Algorithms	4	Wrap-around (Text Book)
12.	MMTE-003	Pattern Recognition & Image Processing *	4	Wrap-around (Text Book)
13.	MMTE-004	Computer Graphics *	2	Wrap-around (Text Book + Study Guide)

Fourth Semester

S. No	Course Code (Tentative)	Title of the Course	Credits	Type of Material Available
14.	MMTE-005	Coding Theory *	4	Wrap-around (Text Book)
15.	MMTE-006	Cryptography *	4	Print (3 blocks)
16.	MMTE-007	Soft Computing & its Applications *	4	Print (4 Blocks)
17.	MMTP-001	Project	4	Project Guide

Despatch of Study Material

The study material is despatched to you semester-wise. The **first** semester material is despatched in **February**. The **third** semester material is despatched in **January** and material for **second** and **fourth** semesters is despatched in **July**. If you do not get your study material in time, write to the **Regional Centre concerned**. A sample prescribed application form for this purpose is enclosed as Form No.1 in the programme guide.

2.4 Evaluation

The system of evaluation, both for theory courses and courses with practical component comprise of continuous evaluation in terms of assignments. and the term-end examination (held twice a year in June and December).

Weightage of continuous evaluation and term-end examination of various courses of the programme are shown in the table given on the next page.

- **Examination Fee**

You have to pay the examination fee* of Rs.120/- per course through Bank Draft in favour of IGNOU payable at Delhi. The examination forms are available at all the Study Centres and Regional Centres. A sample prescribed form with all the rules and regulations in detail is enclosed as Form No.2 in the programme guide. You can also submit on-line examination form as per the guidelines through IGNOU website at www.ignou.ac.in.

- Examination Centre**

Usually the programme study centre is the examination centre. However, you can choose a different examination centre. In case you wish to take examination at a particular centre, you should fill up the code of that centre as examination centre code. However, if the examination centre you choose is not activated, the university will allot another examination centre under the same region.

Weightage of Theory and Practical courses

Course	Theory		Practical	
	Continuous assessment (Assignment)	Term End Examination	Continuous assessment	Term End Examination
MMT-001	20%	20%	10%	50%
MMT-002	30%	70%	NIL	NIL
MMT-003	30%	70%	NIL	NIL
MMT-004	30%	70%	NIL	NIL
MMT-005	30%	70%	NIL	NIL
MMT-006	30%	70%	NIL	NIL
MMT-007	20%	50%	10%	20%
MMT-008	20%	50%	10%	20%
MMT-009	20%	70%	10%	NIL
MMTE-001	20%	50%	10%	20%
MMTE-002	30%	70%	NIL	NIL
MMTE-003	20%	50%	10%	20%
MMTE-004	20%	50%	10%	20%
MMTE-005	20%	50%	10%	20%
MMTE-006	20%	50%	10%	20%
MMTE-007	20%	50%	10%	20%

- Date of Submission of Examination Forms**

June, TEE	December, TEE	Late Fee	Address
1 st March to 31 st March	1 st Sept. to 30 th Sept.	NIL	For outside Delhi students (Regional Centre concerned). For Delhi students (IGNOU, Maidan Garhi, New Delhi – 110068 or Regional Centre concerned).
1 st April to 30 th April	1 st Oct. to 30 th Oct.	Rs.500/-*	
1 st May to 15 th May	1 st Nov. to 15 th Nov.	Rs.1000/-*	
16 th May to 28 th May	16 th Nov. to 28 th Nov.	Rs.1000/-	

(*Note that the fees are subject to change.)

To avoid discrepancies in filling up examination form/hardship in appearing in the term-end examination you are advised to:

1. remain in touch with your Programme Study Centre/Regional Centre/SED for change in schedule of submission of examination form if any;
2. fill up the examination form for next term-end examination without waiting for the result of the previous term-end examination and also filling up the courses, for which result is awaited;
3. fill up all the particulars carefully and properly in the examination form to avoid rejection/delay in processing of the form;
4. retain a copy of the form and the proof of mailing/submission of examination form till you receive examination hall ticket;

- **Issue of Examination Hall Ticket**

University issues Examination Hall Ticket to you 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. **Please note that you have to carry the Identity Card issued by the University with you when you appear for the Term End Examination. Otherwise, you will not be allowed to appear in the examination, even if you have the hall ticket.**

Your enrolment 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.

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 four years 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, please clearly write your enrolment number and complete address. In the absence of such details, it is not possible to attend to your problems.

Practical Evaluation

Evaluation of the practicals for courses with a practical component comprises of two aspects. Evaluation of practical exercises which you do throughout the semester under the guidance of your counsellors at the programme study centre, constitutes **continuous evaluation** and carries 10% weightage. On the other hand, the evaluation of unguided practical exercise assigned to you, which you perform towards the end of the semester, at your programme study centre constitutes **term-end** evaluation and carries 20% weightage for all the courses except MMT-001 where it is 50%. The schedule of term-end practical examination will be notified to you by the Facilitator/Assistant coordinator of your Programme Study Centre.

You must get the flow chart/source code of the program written/any other output, related to each exercise of your practical assignments checked and signed by your counsellor and maintain a file of these signed assignments. This file will be a part of your continuous assessment and you will be required to produce it at the time of the term-end practical exam.

You will have to obtain at least 40% marks in each course (both in theory and practical) in both continuous and terminal evaluation separately. However, the overall average should also be at least 40% for the successful completion of a course.

Project Evaluation

Project evaluation comprises of three aspects, viz., continuous assessment, project report and viva-voce. Weightage for each of these components is 35%, 30% and 35%, respectively. For successful completion of the project work you will have to obtain at least 40% marks in **each of the three components** above **separately**. The overall pass percentage is 40 as well. For more details related to the project work please read the Project Guide of MMTP-001 carefully before doing your project. The project report should be submitted to:

**The Registrar
Student Evaluation Division
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110 068**

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 fee of Rs.1000/- per course by means of demand draft drawn in favour of IGNOU and payable at New Delhi along with an 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.

Early declaration of result is permissible in term-end examinations only and not in Practicals/Lab courses, Project and Assignment.

A sample prescribed application form with rules and regulations in detail for this purpose is enclosed as Form No.13 in the programme guide and is also available at University's website www.ignou.ac.in.

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 i.e. the date on which the results are made available on the University's website. You are required to pay Rs.750/- 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 and marks after re-evaluation will be considered and updated in student's record.

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 in detail for this purpose is enclosed as Form No.3 in the programme guide and is also available at University's website www.ignou.ac.in.

Improvement in Division/Class

If you have completed the programme and wish to improve your Division/Class you may do so by appearing in term-end examination provided you fall short of 2% marks to secure overall 55% marks.

You may apply in the prescribed application form from 1st to 30th April for June term-end examination and from 1st to 31st October for December term-end examination alongwith fee @ Rs.750/- per course by means of demand draft drawn in favour of IGNOU and payable at New Delhi.

The improvement is permissible in term-end examination only and not in Practicals/Lab courses, Project and Assignments.

A sample prescribed application form with rules and regulations in detail for this purpose is enclosed as Form No.14 in the programme guide and is also available at University's website www.ignou.ac.in.

Photocopy of the evaluated answer script

The students may obtain the photocopy of the evaluated answer scripts for the term-end examination on request. They may 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 along with the requisite fee of Rs.100/- per course by means of demand draft drawn in favour of 'IGNOU' and payable at 'New Delhi'.

A sample prescribed application form with rules and regulations in detail for this purpose is given as Form No.15 in the programme guide and also made available at University's website www.ignou.ac.in.

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 as under by means of demand draft in favour of 'IGNOU' and payable at 'New Delhi':-

1. Rs.300/- per transcript, if it is to be sent to the students/institutes in India.
2. Rs.500/- per transcript, if required to be sent to the Institutes outside India by the University.

A sample prescribed application form with rules and regulations in detail for this purpose is given as Form No.16 in the programme guide and also made available at University's website www.ignou.ac.in.

3. OTHER USEFUL INFORMATION

Reservation

The University provides reservation of seats for Scheduled Castes, Scheduled Tribes, non-creamy layer of OBC, War widows, Kashmiri Migrants and Physically Handicapped learners, as per the Government of India rules, for various programmes of the University.

Scholarships and Reimbursement of Fee

Reserved Categories viz., Scheduled Castes, Scheduled Tribes, Other Backward Classes and Physically Handicapped students have to pay the full fee at the time of admission to the University along with other Students.

Physically Handicapped students 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 concerned.

Similarly, SC/ST, and Other Backward Classes students also have to collect and submit the filled in scholarship forms to the respective State's Directorate of social Welfare or Office of the Social Welfare Officer, through the concerned Regional Director of IGNOU for reimbursement of Programme fee.

Scholarship scheme of National Centre for Promotion of Employment of Disabled People (NCPEDP) for post graduate level programme is applicable to the students of this University also. Such students are advised to apply to awarding authority.

Change/Correction of Address and Programme Centre

There is a printed card for change/correction of address and change of Study Centre which is dispatched along with the study material. In case there is any correction/change in the address, you are advised to make use of Form No.4 provided in the Programme Guide and send it to the **Regional Director concerned** who will forward the request, after verifying your signature, to SR&E Division, Maidan Garhi, New Delhi – 110 068. **Requests received directly at SRD, New Delhi will not be entertained. The form for change of address can also be downloaded from IGNOU website www.ignou.ac.in.** You are advised not to write letters to any other officer in the University in this regard. Normally, it takes 4-6 weeks to effect the change. Therefore, you are advised to make your own arrangements to redirect the mail to the changed address during this period. In case a change of Study Centre is desired, you are advised to fill the proforma and address it to the Regional Centre concerned. You can request a change to only those Programme Study Centres where M.Sc. (MACS) is activated. Request for change of Study Center is normally accepted subject to availability of seat for the programme at the new centre asked for. Change of Address and Study Centre are not permitted until admissions are finalized. **Similarly, change of Study Centre is not permissible in programmes where practical components are involved.**

Incomplete and Late Applications

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

Refund of Fee

Fee once paid will not be refunded under any circumstances. It is also not adjustable against any other programme of this University. However, in cases where University denies admission, the programme fee

will be refunded after deduction of registration fee **through A/c Payee Cheque only by Regional Centre concerned.**

Credit Transfer

“Credit transfer” means allowing a student of another university to get admitted to IGNOU for completing any equivalent degree/diploma programme on the basis of credits obtained by him/her from that University. A student thus admitted need not write IGNOU examinations for such courses which are found equivalent to and for which appropriate credits would be deemed to have been acquired for, and for purposes of fulfilling the IGNOU requirements for award of a degree/diploma.

Eligibility

The credit transfer scheme is applicable only to those candidates who have not completed their degree from any other recognized university but want to complete it through IGNOU.

Modalities

- The credit transfer scheme for M.Sc. (MACS) is applicable only from post-graduate courses.
- Credit transfer will be permissible in the case of students coming from institutions established by an Act of Parliament or by an Act of State Legislature, or a “Deemed to be University”, or an “Institution of National Importance”, or institutions recognized by statutory bodies like AICTE, ICMR, ICAR, CSIR, etc.
- Credit transfer can be done **only on the basis of individual courses** and not on the basis of year to year courses as in conventional institutions.
- Credit transfer for a maximum of 50% credits (i.e., upto 32 credits) of this programme is permissible. In order to complete M.Sc. (MACS) programme from IGNOU, a student will be required to earn **at least 50%**, i.e., 32 credits from this programme. However, those students who fail to complete the programme in the prescribed period can apply for fresh admission. If they are admitted, they will be given credit transfer for all the courses which have not been revised in the intervening period.
- The degree certificate or the mark sheet given to the students will specifically indicate the credits earned in IGNOU and those obtained from any other institution.
- The basis of credit transfer will be
 - a) Course coverage of **at least 75%**.
 - ii) A **minimum** of 40% marks clearly obtained for this coverage.
- IGNOU “Programme” and “Courses” means “courses” and “subjects” or “papers”, respectively of conventional universities.
- Students seeking credit transfer should apply directly to **The Registrar (SRD), IGNOU, Maidan Garhi, New Delhi-110 068**, in the prescribed form enclosing the following items:
 - i) A Demand Draft of Rs.200/- per course drawn in favour of **IGNOU and Payable at New Delhi.**
 - ii) Attested copies of Mark Sheet(s); and
 - iii) Attested copies of syllabi of courses covered by them.
- Applications for credit transfer will be examined by the Mathematics Discipline Group at the Headquarters of the University. **This process will usually take a period of two months from the date of receipt of such requests with all the relevant documents.** A sample prescribed application form for this purpose is enclosed as Form No.7 in the programme guide.

Issue of Duplicate Grade Card/Mark sheet

A duplicate Grade Card is issued after a request is made on the prescribed form (**Form No.5**) along with a draft of Rs.200/- to be paid in favour of **IGNOU, New Delhi**. The form for this purpose is given in this programme guide.

Re-admission

If you are not able to complete the programme in a maximum of 4 years, the University has made a special provision for re-admission. The re-admission period for Master degree programme is 2 years. The form and the guidelines are available in the Programme Guide (**Form No.12**). Kindly fill and submit it as per instructions.

Recognition

IGNOU Degree/Diplomas/Certificates are recognised by all member Universities of Association of Indian University (AIU) and are at par with Degrees/Diploma/Certificates of all Indian Universities/Institution, as per UGC Circular letter No. F.1-52/2000 (CPP-II) dated May 5, 2004, AIU Circular No. EV/11 (449/94/176915-177115) dated January 14, 1994 and AICTE circular No. AICTE/Academic/Nov-Dec/2005 dt. May 13, 2005.

Disputes

Regarding any disputes on University matters, the place of jurisdiction for filing a suit, if necessary, will only be at New Delhi/Delhi.

Some Useful Contact Addresses

1) For non-receipt of study material, assignments etc.	Regional Centre concerned
2) For Programme centre and missing score of assignments & term end examination in Grade Cards.	Assignments 1. Assistant Registrar (Assignment) Student Evaluation Division Block-3, Room No. 12 IGNOU, Maidan Garhi New Delhi – 110 068 assignments@ignou.ac.in 2. Dy. Registrar (EX-III) Student Evaluation Division Block-12, Room No. 1 IGNOU, Maidan Garhi New Delhi – 110 068 skranthan@ignou.ac.in
3) For Student Support Service	Regional Director Student Service Centre IGNOU, Maidan Garhi New Delhi – 110 068 ssc@ignou.ac.in
4) Student Grievances related to examinations	Assistant Registrar (Student Grievance Cell) Student Evaluation Division Block-3, Room No. 13 IGNOU, Maidan Garhi New Delhi – 110 068 sregrievance@ignou.ac.in
5) For Purchasing Audio/Video Tapes	Marketing Unit, EMPC Indira Gandhi National Open University, Maidan Garhi New Delhi-110068
6) For academic matters	Director, School of Sciences Indira Gandhi National Open University Maidan Garhi, New Delhi-110068 E-mail: sos@ignou.ac.in .

You are also advised to get in touch with the Facilitator/Assistant coordinator of your study centre for timely information.

4. SOME FORMS FOR YOUR USE

We are enclosing the samples of following forms for your use.

1. Intimation of Non-receipt of Study Material/Assignment (Form No.1)
2. Examination Form (Form No.2)
3. Form for Re-evaluation of Answer-scripts (Form No.3)
4. Change/Correction of Address and Programme Centre (Form No.4)
5. Form for Duplicate Grade Card (Form No.5)
6. Form for Provisional Certificate (Form No.6)
7. Form for Credit Transfer (Form No.7)
8. Migration Certificate Form (Form No.8)
9. Course Re-registration Form for Second Semester (Form No.9)
10. Course Re-registration Form for Third Semester (Form No.10)
11. Course Re-registration Form for Fourth Semester (Form No.11)
12. Re-admission Form (Form No.12)
13. Early Declaration of Result (Form No.13)
14. Improvement in Division/Class (Form No.14)
15. Form for Photocopy of the Evaluated Answer Script (Form No.15)
16. Issue of Official Transcript (Form No.16)

To,
Regional Director concerned

Sub: Non-receipt of Study Material/Assignment

Enrolment No.

Programme

Medium of Study

I have not received the Study Material/Assignments in respect of the following:

Sl. No.	Course Code	Blocks	Assignments
---------	-------------	--------	-------------

I have remitted all the dues towards the course fee and there is NO CHANGE in any address given as follows:

Name and Address:

Signature:
 Date:

For Official Use

Date of despatch of study material/assignments to students.



INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION
MAINDAN GARHI, NEW DELHI-110 068
TERM END EXAM JUNE/DECEMBER-20_____

EXAM FORM

Serial No.

Control No.

INSTRUCTIONS

1. Use BLACK BALL POINT PEN in boxes using English capital letters or English numerals
2. Write in CAPITAL LETTERS only within the box without touching the lines as shown in the sample below.

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Programme Code Study Centre Code

Enrolment No. Exam Centre Code (where you wish to appear in Exam)

Name of the Candidate (Leave one box empty between First Name, Middle Name and Surname)

Address for Correspondence (Do not give Post Box No. address. Leave a blank box between each unit of address like House No., Street Name, P.O., etc.)

City District

State Pin Code

COURSE OPTION:

Course codes for which appearing for the First time OR failed in the earlier TEEs including Practical Courses for BCA, MCA, BIT/ADIT/PGDLAN/BLIS Programme FEE @ Rs.120/- PER COURSE				Course codes (Exam already taken in last TEE but result awaited on the date of submission of the exam form) (For result please visit IGNOU site www.ignou.ac.in) NO EXAM FEE TO BE PAID	
S. No.	Course Code	S. No.	Course Code	S. No.	Course Code
1.	<input type="text"/>	9.	<input type="text"/>	1.	<input type="text"/>
2.	<input type="text"/>	10.	<input type="text"/>	2.	<input type="text"/>
3.	<input type="text"/>	11.	<input type="text"/>	3.	<input type="text"/>
4.	<input type="text"/>	12.	<input type="text"/>	4.	<input type="text"/>
5.	<input type="text"/>	13.	<input type="text"/>	5.	<input type="text"/>
6.	<input type="text"/>	14.	<input type="text"/>	6.	<input type="text"/>
7.	<input type="text"/>	15.	<input type="text"/>	7.	<input type="text"/>
8.	<input type="text"/>	16.	<input type="text"/>	8.	<input type="text"/>

FEE DETAILS (Please write you Name & Enrolment No. at the back of the Draft)

Total No. of	Total Amt.	1. Draft No.	<input type="text"/>
Courses <input type="text"/> × 120	<input type="text"/>	Amount	<input type="text"/>
Practical Courses <input type="text"/> × 120	<input type="text"/>	2. Draft No.	<input type="text"/>
Late Fee <input type="text"/>	<input type="text"/>	Amount	<input type="text"/>
Total	<input type="text"/>	Date	<input type="text"/> / <input type="text"/> / <input type="text"/>
SIGNATURE OF THE STUDENTS (within the Box only) <input type="text"/>		Issuing Branch	
		Payable at	N E W D E L H I

ISSUING BANK

DECLARATION

I hereby affirm that I have submitted/will submit all the required number of assignments as applicable for the above course(s) within the deadlines prescribed by the University to the appropriate authority for evaluation. I also affirm that my registration for the above course(s) is valid and not time barred. If any of my above statements are found to be untrue, I will have no claim for taking examination. I undertake that I shall abide by the rules and regulations of the University.

Date: _____

(Signature of the Students)

Dates for Submission of Exam Forms

FOR JUNE TEE	LATE FEE	FOR DEC. TEE	LATE FEE
1 st March to 31 st March	NIL	1 st Sept. to 30 th Sept.	NIL
1 st April to 30 th April	Rs.500/-	1 st Oct. to 30 th Oct.	Rs.500/-
1 st May to 15 th May*	Rs.1000/-	1 st Nov. to 15 th Nov.*	Rs.1000/-
16 th May to 28 th May*	Rs.1000/-	16 th Nov. to 28 th Nov.*	Rs.1000/-

* During these dates submit the examination form with late fee to concerned Regional Centre (For outside Delhi); For Delhi, submit to the Registrar (SED), Exam for these students will be conducted at Regional Centre city only.

Examination form without late fee can be submitted by Regd. Post/Speed Post alongwith the requisite fee (in the form of demand draft at SE Division, IGNOU, Maidan Garhi, New Delhi – 110 068 or at the concerned Regional Centre within the stipulated dates.

INSTRUCTIONS FOR FILLING UP THE EXAM FORM

1. Please send the examination form by Registered Post/Speed post and retain the proof of its mailing till you receive the Hall Ticket.
2. Students should submit the examination form only once for each Term-end Examination.
3. Examination fee @ Rs.120/- per course in the form of demand draft drawn in favour of IGNOU and payable at New Delhi is required to be sent along with the Examination Form.
4. **It is advisable that students fill-up the examination form without waiting for the result of the previous examination. No Examination fee is required to be paid for the courses for which the student appeared in the preceding TEE and the result has not been declared on the date of submission of the Examination form.**
5. Term-end Examination result is also available on the university website i.e., www.ignou.ac.in Please see the result status before filling examination form.
6. If you fail to receive Examination Intimation Slip one week before commencement of examination, you may visit our website www.ignou.ac.in and download Hall Ticket and report to Examination Centre with your Identity Card.
7. Normally the Study Centre is the Examination Centre. In case you wish to take examination at a particular centre, the code of your chosen centre be filled up as Examination Centre Code. However, if Examination Centre chosen by you is not activated, you will be allotted another Examination Centre under the same Region.
8. Change of Examination Centre, once allotted, is not permissible under any circumstances.
9. Please write correct course code(s) as indicated in your Programme Guide, failing which the course(s) will not be included in Hall Ticket for taking examination. (For example ECO-01/NS-02).
10. In case wrong/invalid course code is mentioned in examination form, the course will not be included in the Hall Ticket and the examination fee paid will not be refunded.
11. Students are advised to enclose/forward only the Examination fee alongwith this form. Any other fee forwarded with the Exam fee will result in rejection of the Examination Form.
12. Student of BA/B.Com/BCA/BTS Programme can take examination for courses up to 48 credits and those of Management Programme can take examination for a maximum of 8 courses at a time.
13. Examination Form can also be submitted with the requisite fee (with or without late fee) within the stipulated dates at the respective Regional Centres.
14. Examination fee once paid will not be refunded/adjusted.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI-110 068**

APPLICATION FORM FOR RE-EVALUATION OF ANSWER-SCRIPTS

(Rules & regulations are mentioned on the reverse side of this form. Please go through them carefully before filling up the form).

1. Name:

2. Programme: Enrolment No:

3. Address:
.....
..... Pin

4. Month and Year of the Examination:

5. Examintaion Centre Code:

6. Address of the Examination Centre:
.....

7. Courses, in which re-evaluation is sought	COURSE CODE	MARKS/GRADE OBTAINED
.....
.....
.....
.....
.....

8. Fee detail:-

(The fee for Re-evaluation of answer script is Rs.750/- per course, which is to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of Course(s)..... × Rs.750/- Total Amount

Demand Draft No. Date

Issuing Bank

Date:

(Signature of the Student)

RULES & REGULATIONS FOR RE-EVALUATION OF ANSWER SCRIPTS

1. The request for re-evaluation by the student must be made before 31st March for December TEE and 30th September for June TEE or within one month of declaration of results whichever is later.
2. The date of declaration of results will be calculated from the date of which the result are placed on the IGNOU website.
3. After re-evaluation, the better of the two scores of original marks/grade and marks/grade after re-evaluation will be considered.
4. The revised marks/grade after re-evaluation shall be communicated to the student on receipt of re-evaluation result and result of re-evaluation will also made available on the IGNOU website at www.ignou.ac.in. The minimum time required for re-evaluation shall be 30 days from the date of receipt of applications.
5. Re-evaluation is permissible in TEE only and not in the Projects/Dissertation/Practicals/Lab courses, Workshops, Assignments & Seminar etc.
6. On the top of the envelope containing the prescribed application form, Please mention “**APPLICATION FORM FOR RE-EVALUATION OF ANSWER SCRIPTS**”
7. Application form must reach within the prescribed dates at the following address:-

**The Registrar,
Student Evaluation Division,
Indira Gandhi National Open University,
Maidan Garhi,
New Delhi-110 068**

APPLICATION FOR CHANGE OF ADDRESS AND PROGRAMME CENTRE

Date: _____

To,
Regional Director concerned

Enrolment No. _____

Programme _____

Name (in caps) _____

DETAILS FOR CHANGE/CORRECTION OF MAILING ADDRESS

New Address

Old Address

City _____ Pin _____

City _____ Pin _____

State _____

State _____

DETAILS FOR CHANGE OF PROGRAMME CENTRE

New Programme Centre	Old Programme Centre
----------------------	----------------------

Programme Centre Code _____

Programme Centre Code _____

City _____ Pin _____

City _____ Pin _____

State _____

State _____

Date: _____

Signature of Student



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION**

APPLICATION FORM FOR ISSUE OF DUPLICATE STATEMENT OF MARKS/GRADE

1. Name:

2. Programme: Enrolment No:

3. Address:

.....

..... Pin

4. Fee details:

(The fee for duplicate grade card is Rs.200/-, which is to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

Demand Draft No. Date

Issuing Bank

Date:

(Signature of the student)

The filled in form with the requisite fee is to be sent to:

**The Registrar,
Student Evaluation Division,
Indira Gandhi National Open University,
Maidan Garhi,
New Delhi-110 068**

**Indira Gandhi National Open University
Student Evaluation Division
Maidan Garhi, New Delhi – 110 068**

APPLICATION FORM FOR ISSUE OF PROVISIONAL CERTIFICATE

Enrolment No.

--	--	--	--	--	--	--	--	--	--

Programme Title

Name: _____

Father's name: _____

Month and year of last examination in which you have completed the Programme

Mailing address

.....

.....

.....

Please write the names of the course(s) successfully completed and enclose a copy of your complete grade card.

1.
2.
3.
4.
5.
6.

.....
Signature

Date:

The filled in form is to sent to:

**The Registrar
Student Evaluation Division
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110 068**

Indira Gandhi National Open University
Maidan Garhi, New Delhi – 110 068

APPLICATION FORM FOR CREDIT TRANSFER IN M.Sc (MACS) PROGRAMME

Enrolment No.

Name & Address

.....

.....

.....

Programme of study:

Details of Credit Transfer fee paid:

D.D. No..... Date..... Amount.....

Drawn on (Bank & Branch).....

Payable in favour of IGNOU, New Delhi
 (fee is Rs.200/- per course)

Details of Courses applied for Credit Transfer:						IGNOU Credit Equivalence desired			
Sl. No.	Subject(s) Qualified	Maximum Marks	% age of marks	Marks Obtained	Year of Passing	Course code	Course Title	Credits	
All the information provided above is true to the best of my knowledge						Student Signature & Date:			
(For Office use only)									
Recommendation of School:									
Credit Transfer recommended for the following courses					Credit Transfer for the following courses not recommended				
Course Code	Course Title	Credits Marks	% age	Signature of Director of School	Course Code	Course Title	Credits	Reason for rejection	Signature of the Director of School

INDIRA GANDHI NATIONAL OPEN UNIVERSITY

(To be submitted at the Regional Centre Concerned)

Received Rs. _____
D.D. No. _____
Date: _____
Bank Name _____
Place of Issue _____

FORM OF APPLICATION FOR ISSUE OF MIGRATION CERTIFICATE

(To be filled by the Applicant – Before filling in the form, see instructions on reverse)

1. Name and address of the Applicant:				
2. Father's Name:				
3. Particulars of last Examination:				
Examination Passed (Programme)	Year of Passing	Enrolment No.	Marks Obtained	Grade Obtained
4. Name of the Regional Centre and Study Centre to which the Candidate is attached				
5. Name of the University to which the Candidate wants to migrate				

.....
(To be filled in by the Regional Centre)

1. The information furnished by Shri/Smt./Kum. _____ is correct as per the scholar register.
2. He/She may be issued the Migration Certificate applied for.

Date _____

Dealing Assistant

Section Officer

I hereby declare that the information provided is correct to the best of my knowledge and I have paid all the fees due to the University. In the event of any information being found incorrect the Certificate shall be liable to cancellation by the University.

Received the Migration Certificate No. _____ Dated _____

Dated: _____

Signature of the Applicant

Note: See instructions overleaf

P.T.O

INSTRUCTIONS

A fee of Rs.300/- should be remitted by way of a Demand Draft drawn in favour of IGNOU and payable at the Regional Centre concerned.

At the time of submission of the application for issue of Migration Certificate, the applicant should attach a xerox copy of the consolidated Statement of Marks or Provisional Certificate issued by this University (duly attested) for verification.

Duplicate Migration Certificate can be issued on payment of Rs.200/- only in case the same has been lost, destroyed or mutilated, on admission of an Affidavit drawn upon a non-judicial stamp paper of the value of Rs.2/- to be sworn before a Magistrate on the following format:

“I, _____ son/daughter of _____, resident of _____ hereby solemnly declare that the Migration Certificate No. _____ dated _____ issued to me by the _____ to enable me to join _____ University has been lost and that I did not join any other University on basis of the same nor have I submitted the same for joining any other University”.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
COURSE RE-REGISTRATION FORM FOR M.Sc (MACS)**

Form No. 9

Enrolment No.

Regional Centre Code

Study Centre Code

Send this filled-in form along with fee to:
The Regional Director of your Regional Centre
* as per schedule

Semester to which registration is sought (Please \checkmark):

M.Sc. (MACS)		
II	III	IV
\checkmark		

1. Name of the Student (In capital letters): _____

2. Complete Address: _____

Details of fee paid: Draft is to be made in the name of IGNOU payable at the city of the Regional Centre.

a. Name of the Bank _____ Place _____

b. Bank Draft No. _____ Dated _____

c. Amount of Rs. _____

(Rs. 5500/- + the late fee as applicable)

(If you have paid the fee by way of Challan at the designated Bank Branch, attach the Challan, in original)

I hereby register for the following courses of **M.Sc. (MACS)** commencing **July Session**.

List of Courses

The list of courses on offer for II semester is given below. **All courses are compulsory.**

Second Semester

S. No	Course Code	Title of the Course	Type of Course	Credits
1.	MMT-003	Algebra	Core	4
2.	MMT-006	Functional Analysis	Core	4
3.	MMT-008	Probability and Statistics	Core	8

- Note:**
- 1) For all the above courses, a student is eligible for appearing in TEE after six month of commencement of session. For this you may fill up the examination form as per schedule notified by the University.
 - 2) Please keep a photocopy of this form for your record.

Date: _____

Signature of student _____

E-Mail ID _____

Mobile/Ph. No. _____

***Schedule for submission of Re-registration form at the Regional Centre only:**

S. No.	July Session	January Session	Late Fee
1.	1 st February to 31 st March	1 st August to 1 st October	Nil
2.	1 st April to 30 th April	3 rd October to 31 st October	Rs.200/-
3.	1 st May to 31 st May	1 st November to 30 th November	Rs.500/-
4.	1 st June to 20 th June	1 st December to 20 th December	Rs.1000/-

PS: Students are required to fill-up compulsorily the statistical information in the enclosed Annexure-I of the RR Form.

INFORMATION FOR STATISTICAL PURPOSE. STUDENTS ARE REQUIRED TO FILL-UP THIS ANNEXURE COMPULSORILY.

1. Name of student: _____
2. Enrol. No.:
3. Programme Code:
4. Category: (Cross (X) the appropriate Box only)
General SC ST OBC
5. Whether Kashmiri Migrant: (Cross (X) if applicable)
6. Whether Physically handicapped: (Cross (X) if applicable)
7. Whether minority: (Cross (X) if applicable)
8. Social Status: (Cross (X) the appropriate Box only)
Ex-service man War-widow Not applicable
9. Employment Status: (Cross (X) the appropriate Box only)

Unemployed Employed IGNOU Employee KVS Employee
10. Religion: Cross (X) the appropriate Box only

Hindu Muslim Christian Sikh Jain Buddhist Parsi Jew Others
(Please specify _____)
11. Details of Scholarship being received, if any.
(a) Amount (annually) (b) Govt./Deptt. (c) Family income (yearly)
 Rs. Rs. Rs.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
COURSE RE-REGISTRATION FORM FOR M.Sc (MACS)**

Form No.10

Enrolment No.

Regional Centre Code

Study Centre Code

Send this filled-in form along with fee to:
The Regional Director of your Regional Centre

* as per schedule

Semester to which registration is sought (Please \checkmark):

M.Sc. (MACS)		
II	III	IV
	\checkmark	

- Name of the Student (In capital letters): _____
- Complete Address: _____

Details of fee paid: Draft is to be made in the name of IGNOU payable at the city of the Regional Centre.

- Name of the Bank _____ Place _____
- Bank Draft No. _____ Dated _____
- Amount of Rs. _____
(Rs. 5500/- + the late fee as applicable)

(If you have paid the fee by way of Challan at the designated Bank Branch, attach the Challan, in original)

I hereby register for the following courses of **M.Sc. (MACS)** commencing **January Session**.

List of Courses

The list of courses on offer for III semester is given below. **All courses are compulsory.**

Third Semester

S. No	Course Code	Title of the Course	Type of Course	Credits
1.	MMT-009	Mathematical Modelling	Core	2
2.	MMTE-001	Graph Theory	Elective	4
3.	MMTE-002	Design & Analysis of Algorithms	Elective	4
4.	MMTE-003	Pattern Recognition & Image Processing	Elective	4
5.	MMTE-004	Computer Graphics	Elective	2

- Note:**
- For all the above courses, a student is eligible for appearing in TEE after six month of commencement of session. For this you may fill up the examination form as per schedule notified by the University.
 - Please keep a photocopy of this form for your record.

Date: _____

Signature of student _____

E-Mail ID _____

Mobile/Ph. No. _____

***Schedule for submission of Re-registration form at the Regional Centre only:**

S. No.	July Session	January Session	Late Fee
1.	1 st February to 31 st March	1 st August to 1 st October	Nil
2.	1 st April to 30 th April	3 rd October to 31 st October	Rs.200/-
3.	1 st May to 31 st May	1 st November to 30 th November	Rs.500/-
4.	1 st June to 20 th June	1 st December to 20 th December	Rs.1000/-

PS: Students are required to fill-up compulsorily the statistical information in the enclosed Annexure-I of the RR Form.

INFORMATION FOR STATISTICAL PURPOSE. STUDENTS ARE REQUIRED TO FILL-UP THIS ANNEXURE COMPULSORILY.

1. Name of student: _____
2. Enrol. No.:
3. Programme Code:
4. Category: (Cross (X) the appropriate Box only)
General SC ST OBC
5. Whether Kashmiri Migrant: (Cross (X) if applicable)
6. Whether Physically handicapped: (Cross (X) if applicable)
7. Whether minority: (Cross (X) if applicable)
8. Social Status: (Cross (X) the appropriate Box only)
Ex-service man War-widow Not applicable
9. Employment Status: (Cross (X) the appropriate Box only)

Unemployed Employed IGNOU Employee KVS Employee
10. Religion: Cross (X) the appropriate Box only

Hindu Muslim Christian Sikh Jain Buddhist Parsi Jew Others
(Please specify _____)
11. Details of Scholarship being received, if any.
(a) Amount (annually) (b) Govt./Deptt. (c) Family income (yearly)
 Rs. Rs. Rs.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
COURSE RE-REGISTRATION FORM FOR M.Sc (MACS)**

Form No.11

Enrolment No.

Regional Centre Code

Study Centre Code

Send this filled-in form along with fee to:
The Regional Director of your Regional Centre
* as per schedule

Semester to which registration is sought (Please \checkmark):

M.Sc. (MACS)		
II	III	IV
		\checkmark

1. Name of the Student (In capital letters): _____

2. Complete Address: _____

Details of fee paid: Draft is to be made in the name of IGNOU payable at the city of the Regional Centre.

a. Name of the Bank _____ Place _____

b. Bank Draft No. _____ Dated _____

c. Amount of Rs. _____

(Rs. 5500/- + the late fee as applicable)

(If you have paid the fee by way of Challan at the designated Bank Branch, attach the Challan, in original)

I hereby register for the following courses of **M.Sc. (MACS)** commencing **July Session**.

List of Courses

The list of courses on offer for IV semester is given below. **All courses are compulsory.**

Fourth Semester

S. No	Course Code	Title of the Course	Type of Course	Credits
1.	MMTE-005	Coding Theory	Elective	4
2.	MMTE-006	Cryptography	Elective	4
3.	MMTE-007	Soft Computing & its Applications	Elective	4
4.	MMTP-001	Project	Compulsory	4

Note: 1) For all the above courses, a student is eligible for appearing in TEE after six month of commencement of session. For this you may fill up the examination form as per schedule notified by the University.

2) Please keep a photocopy of this form for your record.

Date: _____

Signature of student _____

E-Mail ID _____

Mobile/Ph. No. _____

***Schedule for submission of Re-registration form at the Regional Centre only:**

S. No.	July Session	January Session	Late Fee
1.	1 st February to 31 st March	1 st August to 1 st October	Nil
2.	1 st April to 30 th April	3 rd October to 31 st October	Rs.200/-
3.	1 st May to 31 st May	1 st November to 30 th November	Rs.500/-
4.	1 st June to 20 th June	1 st December to 20 th December	Rs.1000/-

PS: Students are required to fill-up compulsorily the statistical information in the enclosed Annexure-I of the RR Form.

INFORMATION FOR STATISTICAL PURPOSE. STUDENTS ARE REQUIRED TO FILL-UP THIS ANNEXURE COMPULSORILY.

1. Name of student: _____
2. Enrol. No.:
3. Programme Code:
4. Category: (Cross (X) the appropriate Box only)
General SC ST OBC
5. Whether Kashmiri Migrant: (Cross (X) if applicable)
6. Whether Physically handicapped: (Cross (X) if applicable)
7. Whether minority: (Cross (X) if applicable)
8. Social Status: (Cross (X) the appropriate Box only)
Ex-service man War-widow Not applicable
9. Employment Status: (Cross (X) the appropriate Box only)

Unemployed Employed IGNOU Employee KVS Employee
10. Religion: Cross (X) the appropriate Box only

Hindu Muslim Christian Sikh Jain Buddhist Parsi Jew Others
(Please specify _____)
11. Details of Scholarship being received, if any.
(a) Amount (annually) (b) Govt./Deptt. (c) Family income (yearly)
 Rs. Rs. Rs.

**STUDENTS REGISTRATION DIVISION
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068**

Form No.12

Date for
Submission 1st
August to 30th
September.

RE-ADMISSION FORM
(For M.Sc. (MACS))

1. Name & Address of the student _____

2. Programme Code:

--	--	--	--	--

3. Enrolment No.

--	--	--	--	--	--	--	--	--	--

4. Programme Centre (Name the city)

--	--	--	--	--	--	--	--	--	--	--

5. Course Fee: @ Rs.300/- per credit

6. Details of course(s) not completed for which re-admission is sought.

S.No.	Course Code	Title of the Course	Credits	Course Fee (Rs.)
Total Rs.				

7. Details of re-registration for the missed year(s)/semester(s), if any:

Year(s)/semester(s)	Course Code(s) of the missed year(s)/semester(s)	Re-registration Fee (Rs.)

8. Total Fee (Col. No. 6, 7) Rs. _____ enclosed vide Demand Draft No. _____

Date _____ of _____ (Name of Bank)

(DD Should be drawn in favour of “IGNOU” payable at New Delhi)

Dated: _____

Mail this “Re-admission” form along with DD to Registrar, SRD, IGNOU, Maidan Garhi, New Delhi-110 068 on or before the last date mentioned above.

Signature of Student

(Please retain a copy of this form for any future reference)

GUIDELINES FOR RE-ADMISSION

1. Re-admission is permissible in the following cases:
 - (a) Students who failed to complete the requirements in full or in part within the maximum span period prescribed.
 - (b) Students who failed to complete the requirement of attendance in practical as prescribed in programme curriculum within the maximum span period prescribed.
2. Students shall not be on rolls of the university beyond the extended period as stated at (3) below.
3. The extended period of two years will commence from the date of completion of the maximum duration of the programme for which the registration was done initially.
4. The credit earned by the student towards his/her courses and assignments successfully completed shall be retained for the revalidated period.
5. No study material will be supplied on re-admission. If the earlier study material is replaced, the student will be required to buy changed course material.
6. The students will be allowed to take re-admission in the old course(s) as long as the examination in the old course(s) is conducted by the University.
7. For the Programme containing practical component, the norms of the fee payable will be as decided by the respective Schools.
8. Students are required to pay the pro-rata re-admission fee in lump sum for all the courses they failed to successfully complete earlier.
9. Pro-rata fee for re-admission would be changed as and when the University revises the Programme fee for various programmes.
10. Other conditions as prescribed by the University relating to the admission and re-admission shall remain the same.
11. The Demand Draft for Re-admission fee should be drawn in favour of IGNOU payable at New Delhi. Please write your Enrol. No., Name and Programme code on the reverse of the Demand Draft.



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION**

APPLICATION FORM FOR EARLY DECLARATION OF RESULT OF TERM-END EXAMINATION

(Rules & regulations are mentioned on the reverse side of this form. Please go through them carefully before filling up the form).

1. Name:
2. Programme: Enrolment No:
3. Address:
.....
..... Pin

4. Reason for early declaration of result: _____

_____ (enclose a copy of the documentary evidence specifying the reason for early declaration)

5. Course(s) detail for early evaluation:

Sl. No.	Course Code	Date of Examination
i.	_____	_____
ii.	_____	_____
iii.	_____	_____
iv.	_____	_____

6. Exam. Centre details, from where you have to appear/appeared at Term-end Examination:

Exam. Centre Code: Address of Exam. Centre: _____

7. Fee details:

(The fee for early declaration of result is Rs.1000/- per course, which is to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of Course(s) × Rs.1000/- Total Amount

Demand Draft No. Date

Issuing Bank

Date:

(Signature of the student)

RULES & REGULATIONS FOR EARLY DECLARATION OF RESULTS

1. Request for early declaration of results will be entertained for final semester/year maximum of 4 backlog courses only, subject to the following conditions:
 - i) The student has been selected for higher study/employment and statement of marks/grade card is required to be produced to the institute by a particular date, which is before the prescribed dates of declaration of the University's results.
 - ii) The student has completed all the other prescribed components except the term-end examination of the courses, for which early evaluation has been sought.
2. Application for early declaration, for the reasons such as to apply for recruitment/higher study/post and promotion purpose etc. will not be entertained.
3. Application without enclosing documentary evidence specifying the reason for early declaration will not be entertained.
4. Application form must reach at the following address before the date of the examination for the course(s) for which early evaluation is sought:

**The Registrar
Student Evaluation Division
Indira Gandhi National Open University
Maidan Garhi
New Delhi – 110 068**



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION**

APPLICATION FORM FOR IMPROVEMENT IN DIVISION/CLASS

(Rules & regulations are mentioned on the reverse side of this form. Please go through them carefully before filling up the form).

Prescribed dates for submission of form:- 1st to 30th April for June Term-end Exam.
1st to 31st October for December Term-end Exam.

1. Name:

2. Programme: Enrolment No:

3. Address:

.....

..... Pin

4. Term-end examination, in which programme completed June/December

Total marks/Overall point grade obtained	Percentage obtained
.....

(Please enclose photocopy of the statement of marks/gardes card)

5. Course(s), in which improvement is sought: Course Code Course Code

- | | |
|---------|---------|
| 1. | 4. |
| 2. | 5. |
| 3. | |

6. Fee details:

(The fee for Improvement in Division is Rs. 750/- per course, which is to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of Course(s) × Rs.750/- Total Amount

Demand Draft No. Date

Issuing Bank

7. Term-end examination, in which you wish to appear: June/December

8. Examination centre details, where you wish to appear in term-end examination:

Exam. Centre Code: City/Town

.....

UNDERTAKING

I hereby undertake that I shall abide by the rules & regulations prescribed by the University for improvement in Division/Class.

Date: Signature

Place: Name:

RULES & REGULATIONS FOR IMPROVEMENT IN DIVISION/CLASS

1. The improvement of marks/grade is applicable only for the students of the Bachelor's/Master's Degree Programme, who have completed the programme. The eligibility is as under:
 - i) The students of Bachelor's/Master's degree programmes who fall short of 2% marks to secure 2nd and 1st division.
 - ii) The students of Master's degree programmes only, who fall short of 2% marks to secure overall 55% marks..
2. Only one opportunity will be given to improve the marks/grade.
3. The improvement is permissible only in theory papers. No improvement is permissible in Practicals/Lab courses, Projects and Assignments.
4. Under the Provision of improvement, a maximum of 25% of the maximum credits required for successful completion of a programme shall be permitted.
5. Students wishing to improve the marks will have to apply within six months from the date of issue of final statement of marks/grade card to them, subject to the condition that their registration for the programme/course being applied for improvement, is valid till the next term-end examination in which they wish to appear for improvement.
6. No student will be permitted to improve if maximum duration to complete the programme, including the re-admission period, has expired.
7. After appearing in the examination for improvement, better of the two examinations i.e., marks already awarded and the marks secured in the improvement examination will be considered. In such cases, the improved marks can be incorporated only on surrender of the Statement of Marks/Grade Card., Provisional Certificate and Degree Certificate already issued to the student.
8. In case of improvement, the month and year of completion of the programme will be changed to the Term-end examination, in which students appeared for Improvement.
9. Students will be permitted for improvement of marks provided the examination for the particular course, in which they wish to improve is being conducted by the University at that time.
10. On the top of the envelope containing the prescribed application form, Please mention '**APPLICATION FORM FOR IMPROVEMENT IN DIVISION/CLASS**'
11. Application form must reach within the prescribed dates at the following address:

**The Registrar
Student Evaluation Division
Indira Gandhi National Open University
Maidan Garhi
New Delhi – 110 068**



INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION

APPLICATION FORM FOR OBTAINING PHOTOCOPY OF THE ANSWER SCRIPT

(Rules & regulations are mentioned on the reverse side of this form. Please go through them carefully before filling up the form).

Prescribed dates for submission of form:- 1st March to 15th April for June Term-end Exam.
1st September to 15th October for December Term-end Exam.

Exam.

1. Name:

2. Programme: [] Enrolment No: []

3. Address:

.....

..... Pin []

4. Details of the course(s), for which photocopy of the answer script(s) is/are required:

(a) Term-end examination: June/December

(b) Exam Centre Code:

(c) Exam Centre Address:

.....

.....

(d) Course(s):

5. Fee details:

(The fee for obtaining photocopy of the answer script is Rs.100/- per course, which is to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of Course(s): x Rs.100/- Total Amount:

Demand Draft No. Date

Issuing Bank

6. Self attested photocopy of the Identity Card: Attached/Not attached issued by the University

UNDERTAKING

I hereby undertake that the answer script(s), for which photocopy(ies), applied for, belongs to me. For this purpose, I am enclosing self attested photocopy of my Identity Card issued by the University. In case, my statement is found false, the University may take action against me as deemed fit.

Date:

Signature:

Place:

Name:

RULES & REGULATIONS FOR OBTAINING PHOTOCOPY OF THE ANSWER SCRIPTS

1. **Photocopy(ies) of the answer script(s) shall be provided to the students from December-2008 term-end examination (TEE), onwards.**
2. **The fee for photocopy of the answer script shall be Rs.100/- (Rupees One Hundred Only) per course. Fee shall be paid in the form of a Demand Draft in favour of IGNOU and payable at New Delhi.**
3. **Application form without self attested photocopy of the Identity Card of the student will not be entertained.**
4. **Student's application form for photocopy(ies) of the answer script(s) shall reach the Concerned Authority (as mentioned below in the last para) alongwith the prescribed fee within 45 days from the date of declaration of results. The date of receipt of application for June term-end examination shall be upto 15th October and for December term-end examination upto 15th April or within 45 days from the date of declaration of result on the University's website, whichever is later.**
5. **The students, who find that any portion of the answer was not evaluated or any totaling error is noticed, may point out the same and submit their representation alongwith a copy of the answer script supplied to them within 15 days. No other query regarding evaluation of answer script shall be entertained.**
6. **The students, who intend to apply for photocopy(ies) of the answer script(s) may simultaneously apply for re-evaluation, if they so desire. The last date for submission of application for re-evaluation will not be extended to facilitate them to point out discrepancy in the evaluation.**
7. **Application form must reach within the prescribed dates at the following address except for the answer scripts of CPE & DPE programmes:**

**The Registrar
Student Evaluation Division
Indira Gandhi National Open University
Maidan Garhi
New Delhi – 110 068**
8. **For the photocopy(ies) of the answer script(s) of CPE & DPE programmes, the application form may be sent to the Regional Centre concerned.**



**INDIRA GANDHI NATIONAL OPEN UNIVERSITY
STUDENT EVALUATION DIVISION**

APPLICATION FORM FOR ISSUE OF OFFICIAL TRANSCRIPT

1. Name:
2. Programme: Enrolment No:

--	--	--	--	--	--	--	--	--	--
3. Address:
.....
..... Pin

--	--	--	--	--	--
4. Purpose for which:
transcript is required
5. Fee details:

Fee for the official transcript:

Rs.300/- per transcript, if to be sent to the student/institute in India.
 Rs.500/- per transcript, if required to be sent to the Institute outside India by the University.
 (The requisite fee is required to be paid through demand draft drawn in favour of 'IGNOU' & payable at 'New Delhi')

No. of transcript(s): ×Rs.300/Rs.500/- Total Amount: Rs.

Demand Draft No. Date

Issuing Bank
6. Whether the transcripts to be mailed by the University: Yes/No (please tick)
7. Name & Address of the University/Institute/Employer (In capital letters) to whom transcript is required to be sent (attach a separate list, if required)
.....
.....
.....

Date: (Signature of the student)

The filled in form with the requisite fee is to be sent to:

The Registrar
 Student Evaluation Division
 Indira Gandhi National Open University
 Maidan Garhi
 New Delhi – 110 068

Note: The students are required to enclose same number of legible photocopies of both sides of the statement of marks/grade card issued to them, as the number of transcripts required.

5. DETAILS OF CORE COURSES

1. Programming & Data Structures (MMT-001)

4 credits

This course is an introduction to the C programming language and basic data structures. The course provides the foundation in programming necessary for the other courses in the programme. The aim of this course is not to produce C programmers, but mathematicians who can write programs in C for research purposes. In this course, the emphasis is heavily on the practicals. The course does not assume any previous knowledge in programming. This course has 3 blocks and a laboratory manual. The first two blocks give an introduction to C programming. The third block is an introduction to data structures using the C language. The laboratory manual gives guidance on the practical component of the course. Practical component of this course is worth 2-credits.

Syllabus

Block 1: Introduction to C Programming Language

- Unit 1 Getting Started
- Unit 2 Data Types in C
- Unit 3 Operators and Expressions in C
- Unit 4 Decision Structures in C
- Unit 5 Control Structures-I

Block 2: Programming in C

- Unit 6 Control Structures-II
- Unit 7 Pointers and Arrays
- Unit 8 Functions-I
- Unit 9 Functions-II
- Unit 10 Files and Structs, Unions and Bit-fields

Block 3: Data Structures

- Unit 11 Introduction to Data Structures; Array
- Unit 12 Lists
- Unit 13 Stacks and Queues
- Unit 14 Trees
- Unit 15 Files

Block 4: Laboratory Manual

- Unit 16 Introduction to Computers
- Unit 17 Introduction to Programming
- Unit 18 List of Practical Sessions

2. Linear Algebra (MMT-002)

2 credits

This short course has been designed, keeping in mind the requirements of the applications that you would be coming across later in this programme. It aims to give you some background in the Jordan form, similarity, orthonormal bases, the Spectral Theorem for normal operators and some decompositions of matrices, all of them with a variety of applications.

While creating this course we have assumed that you have studied at least one semester course in Linear Algebra at the undergraduate level. In particular, we assume that you would have studied the content of the IGNOU course, MTE-02, 'Linear Algebra'. For your information, a copy of this material will be available at your programme centre.

Syllabus

Block 1: Jordan Canonical Form

- Unit 1 Similarity
- Unit 2 Jordan Form
- Unit 3 Applications of the Jordan Form

Block 2: Applications of Unitary Matrices

- Unit 4 Unitary Similarity
- Unit 5 Positive Definiteness
- Unit 6 Matrix Decompositions

3. Algebra (MMT-003)

4 credits

This course has an unusual design. This is because it is built around the knowledge of algebra required for appreciating the applications you will be studying later. What is also unusual about this course is that it is a **wrap-around course** (see P-11 of this Guide). This means that the main book you will be studying is ‘Algebra’ by M. Artin. However, we will be sending you material to help you navigate through the chosen portions of the book. Our material will also have examples and exercises to help you to improve your understanding of the concepts involved.

As in the other courses, we assume that you have the knowledge of the content of the IGNOU course MTE-06, ‘Abstract Algebra’. For your information, a copy of this material will be available at your programme centre.

Syllabus

Block 1: Groups

- Unit 1 Group Operations
- Unit 2 Sylow Theorems and the Symmetric Group
- Unit 3 Special Groups
- Unit 4 Free Groups
- Unit 5 Applications of Semigroups
- Unit 6 Congruences and Applications

Block 2: Finite Group Representations and Field Theory

- Unit 7 Representations of Groups
- Unit 8 Characters
- Unit 9 Fields
- Unit 10 Galois Theory
- Unit 11 Applications of Finite Fields

4. Real Analysis (MMT-004)

4 credits

This course on Real Analysis assumes the knowledge of undergraduate Real Analysis and Calculus courses presented in IGNOU undergraduate mathematical electives MTE-07 and MTE-09 respectively. The topics are chosen with a special emphasis on applications. In this course we have discussed basics of metric space theory, multivariable calculus and measure and integration theory. We have also discussed topics like Fourier Series and Integrals, Wavelets, Signals and Systems. The material is presented in three blocks.

This course consists of three blocks divided into various units. In **Block 1**, we introduce you to the concept of metric spaces. Then, we define the related concepts of continuity, convergence, compactness and connectedness for metric spaces and discuss some characterization properties of these concepts.

In **Block 2**, we study differentiability for functions defined from Euclidean space \mathbf{R}^n to Euclidean space \mathbf{R}^m . We discuss the ways for extending the concept of derivative as well as the related concepts of partial derivatives and directional derivatives from \mathbf{R}^2 to higher dimensional spaces \mathbf{R}^n . We also discuss chain rule, higher derivatives, Taylor’s theorem, Implicit and Inverse function theorems.

In **Block 3**, we introduce you to the concepts of Lebesgue measure and Lebesgue integration. We discuss Fourier Series and Fourier integral of certain functions which are very fundamental to the development of

modern analysis. With the progress in computer technology and effective interplay between computers, mathematics and science, very interesting developments have occurred in recent times in Image Analysis and Signal processing. In this block, we familiarise you with some of these aspects.

Syllabus

Block 1: Metric Spaces

- Unit 1 Introduction to Metric-space
- Unit 2 Convergence and Completeness
- Unit 3 Compactness
- Unit 4 Connectedness

Block 2: Calculus in \mathbb{R}^n

- Unit 5 Derivatives in \mathbb{R}^n
- Unit 6 Higher order Derivatives
- Unit 7 Implicit and Inverse Function Theorem

Block 3: Measure and Integral

- Unit 8 Lebesgue Measure
- Unit 9 Lebesgue Integral
- Unit 10 Fourier Integral
- Unit 11 Signals and Systems

5. Complex Analysis (MMT-005)

2 credits

The study of complex variable theory is of great importance in applications. In the study of Laplace transform, the inverse Laplace transform is obtained easily as a contour integral in a complex plane. The evaluation of a wide class of definite integrals (even along the real axis) is facilitated by the use of the complex integral calculus. Another important application is the use of conformal mapping to solve boundary value problems in two-dimensional potential theory.

This course on complex analysis is developed as a **wrap-around** material around the textbook “**Complex Variables and Applications**” by **J. W. Brown and R. V. Churchill** (Seventh edition). The study guide developed for this course to help you study and understand the prescribed chapters of the textbook consists of six units. We have started the discussion in Unit 1 by introducing the notion of a complex valued functions of a (single) complex variable and defined the concept of limit, continuity and differentiability of the function. Analytic and harmonic functions and their applications in fluid flow, steady heat conduction and electrostatics are discussed here. Complex integrals or contour integrals are discussed in Units 2 and 3. Singularities and series representation of a complex valued function in terms of Taylor and Laurent series are discussed in Unit 4. Unit 5 introduces you to the concept of residue of a complex valued function. Evaluation of definite, trigonometric and improper integrals in terms of the sums of the residues are also discussed here. Finally, Unit 6 deals with elementary transformations viz., linear, inverse and bilinear transformations and conformal mapping. Application of conformal mapping to steady-state temperature problem is also discussed here.

Whenever you study this study guide please keep the textbook along with you. We advise you to go section by section and follow the instructions given there.

Syllabus

Study Guide

- Unit 1 Analytic Function
- Unit 2 Integrals-I
- Unit 3 Integrals-II
- Unit 4 Series
- Unit 5 Residues and Its Applications
- Unit 6 Conformal Mapping and Its Applications

6. Functional Analysis (MMT-006)

4 credits

This course is a 4-credit course. In this course we introduce you to a branch of mathematics known as Functional Analysis. In functional analysis we study function spaces which are sets of functions with additional structures. This provides a major link between mathematics and its applications. The important notions that are dealt in this course are Banach spaces, Hilbert spaces and linear functionals on these spaces. This course assumes the knowledge of linear algebra and basic metric space theory presented in IGNOU undergraduates course on “Linear Algebra” MTE-02 and Block 1 of MMT-004. The course is developed as **wrap-around** material around the book. “**Functional Analysis**” by **B. V. Limaye** (New Age International (P) Ltd., 2nd Edition). In order to help you to study the text book, a study guide is developed which consists of five units. Each unit in these blocks is a guided tour through the relevant parts of the text book. The material also consists of worked out examples, exercises, some application and some explanations on certain portions in the Text Book that we felt that you may find difficult to grasp.

The wrap-around material is divided into 5 units. In **Unit 1**, we discuss some basic concepts in Functional analysis. We introduce to the concept of a “norm” which is another distance measuring concept like a metric. Any linear space having a norm defined on it is called a normed space. Any norm function defines a metric on a normed space and thereby any normed space is a metric space. In this unit, we consider maps which are linear and bounded (also called continuous). We define continuous linear maps from one normed space to another. We also familiarize you to one of the important theorems in Functional Analysis, known as Hahn Banach theorem. **Unit 2** deals with Banach Spaces. Normed spaces which are complete with respect to the metric induced by the corresponding norm are called Banach spaces. The Banach spaces plays a crucial role in the study of function spaces. Here we consider four important theorems – Open mapping theorem, Closed graph theorem, Uniform boundedness principle and Bounded inverse theorem. **Unit 3**, deals with space of bounded linear maps defined from a normed space to the space \mathbf{K} , the scalar field of real or complex numbers. These spaces are called dual spaces. We also consider dual of dual spaces which are called reflexive spaces.

Unit 4 and 5 introduce you to another type of normed spaces known as inner product spaces. An inner product space which is complete, under the norm induced by the inner product, is called a Hilbert space. In Unit 4, we discuss the fundamental properties of inner product spaces more specifically for Hilbert spaces. The inner product enables us to introduce the concept of orthogonality. Unit 4 is devoted to orthonormal sets. Another important theorem for Hilbert spaces namely, Riesz representation theorem is studied in this unit. Finally in **Unit 5** we consider operators on Hilbert spaces. Here we define adjoint of an operator and study three important classes of operators, namely, self-adjoint, unitary and normal operators. We also discuss two important subclasses of self-adjoint operators, viz, positive operators and compact self-adjoint-operator.

Syllabus

Study Guide

Unit 1	Normed Linear Space
Unit 2	Banach Space
Unit 3	Space of Bounded Linear Functionals
Unit 4	Hilbert Space
Unit 5	Operators on Hilbert Space

7. Differential Equations & Numerical Solutions (MMT-007)

4 credits

This course discusses both analytical and numerical methods of solving differential equations. This course assumes the knowledge of the undergraduate IGNOU course “Differential Equations” (MTE-08) and undergraduate IGNOU course “Numerical Analysis” (MTE-10). The course MMT-005 on complex analysis is a co-requisite for this course. This course is divided into four blocks. The first two blocks discuss the analytical methods of solving differential equations, whereas, numerical methods are discussed in Blocks 3 and 4. Blocks 3 and 4 also involve **practical work** worth 1 credit to be done using C-programming, which you have already learnt in your MMT-001 course “Programming and Data Structure”. Practical exercises are given at the end of the units in Blocks 3 and 4.

In Block 1, the Picard's theorem on existence and uniqueness of the solution of initial value problems is proved. After discussing the power series methods of solving linear, homogeneous differential equations with variable coefficients, the Legendre, Hermite, Laguerre polynomials and Bessel functions are discussed in detail. Applications of these polynomials to physical situation like steady-state heat conduction, linear harmonic oscillator, vibrating membrane problems etc., are also illustrated.

Block 2 deals with the Laplace and Fourier transform methods of solving initial and boundary value problems and applications of transform methods to diffusion, wave and Laplace equations.

In Block 3, we have discussed numerical methods of finding solutions of ordinary differential equations, both initial and boundary value problems whereas, finite difference methods and finite element methods for solving partial differential equations are discussed in Block 4.

All the concepts given in the blocks are followed by a lot of examples as well as exercises. These will help you get a better grasp of the techniques discussed in this course.

Syllabus

Block 1: Ordinary Differential Equations (ODEs)

- Unit 1 First and Higher Order Equations
- Unit 2 Power Series Solutions
- Unit 3 Legendre, Hermite and Laguerre Polynomials
- Unit 4 Bessel Functions
- Unit 5 Green's Function Methods

Block 2: Partial Differential Equations (PDEs)

- Unit 6 Laplace Transform Method
- Unit 7 Fourier Transform Method

Block 3: Numerical Solutions of ODEs

- Unit 8 Singlestep Methods for Solving IVPs
- Unit 9 Multistep and Predictor-Corrector Methods for Solving IVPs
- Unit 10 Second Order BVPs

Block 4: Numerical Solution of PDEs

- Unit 11 Finite Difference Methods
- Unit 12 Finite Element Methods

8. Probability and Statistics (MMT-008)

8 credits

This course "Probability and Statistics" is a 8-credit course on Stochastic Processes and Multivariate Analysis. IGNOU undergraduate course "Probability and Statistics" (MTE-11) is a prerequisite for this course. The course consists of eight blocks. The first four blocks of this course are presented to bridge the gap between the theory and applications of stochastic processes. The proofs of theorems which are either too involved or do not help in understanding concepts are omitted. The theorems are supported with applications. In the last four blocks, multivariate analysis has been presented which includes the practical component. This deals with the observation and analysis of two or more than two statistical variables at a time. The practical assignments session-wise are given at the end of corresponding units

Syllabus

Block 1: Markov Chains

- Unit 1 Conditional Probability
- Unit 2 Basics of Markov Chains
- Unit 3 Stationary Markov Chains

Block 2: Markov Processes with Countable State Spaces

- Unit 4 Branching Processes
- Unit 5 Continuous Time Markov Processes-I
- Unit 6 Continuous Time Markov Processes-II

Block 3: Renewal Processes

- Unit 7 Renewal Processes-I
- Unit 8 Renewal Processes-II
- Unit 9 Renewal Processes-III
- Unit 10 Renewal Processes-IV

Block 4: Queueing Theory

- Unit 11 Poisson Queues
- Unit 12 Non-Poisson Queues
- Unit 13 Network of Queues

Block 5: Basics of Multivariate Normal (MVN)

- Unit 14 Some Linear Algebra
- Unit 15 Definition and Properties of MVN-I
- Unit 16 Definition and Properties of MVN-II

Block 6: Distributions Associated with MVN

- Unit 17 Distribution of Correlation Coefficients
- Unit 18 Orthogonal Transformation
- Unit 19 Inference-I
- Unit 20 Inference-II

Block 7: Applications of MVN

- Unit 21 Inference-III
- Unit 22 Inference-IV
- Unit 23 Applications of MVN-I

Block 8: Additional Application of MVN

- Unit 24 Principal Component Analysis
- Unit 25 Factor Analysis
- Unit 26 Canonical Covelation
- Unit 27 Conjoint Analysis

9. Mathematical Modelling (MMT-009)**2 credits**

The use of mathematics in solving real-world problems has become widespread especially due to the increasing computational power of digital computers and computing methods both of which have facilitated the handling of lengthy and complicated problems. This process of translating the real world problems into mathematical problems (mathematical model), solving the mathematical problems and interpreting these solutions in the language of the real world is called “modelling process”. Mathematical modelling is used in almost all the disciplines in Science, Engineering and Technology. Topics in physics like gravitation, mechanics, heat transfer, transfer of energies etc., problems in astro and bio-physics, problems in chemical sciences like kinetics of reaction, industrial chemistry etc. are all studied through modelling. In life sciences and medicine, the subject of mathematical modelling is not very old, but the same is growing rapidly with the advent of computer applications. There are number of topics like ecology, air and water pollution, physiology including cardio-vascular circulation, epidemiology and pharmaco-kinetics which are now studied through mathematical modelling and computer simulation. In this course we have considered some real world problems from population dynamics, environmental systems, finance and economics. This course assumes the knowledge of the undergraduate IGNOU course “Differential Equations” (MTE-08). Also, the knowledge of “Mathematical Modelling” (MTE-14) course will help you in better understanding of some of the models considered in this course.

The course is divided into two blocks. The first block introduces you to the concept of mathematical modelling. After discussing different types of modelling and various steps involved in formulating a model we have discussed models from finance and probability theory. Block 2 deals with the model from population dynamics, ecology, air pollution, medicine and optimization. This course also involve some practical assignments which are to be done using C-programming and constitute the part of your continuous evaluation. These assignments are given at the end of the units in the blocks.

Syllabus

Block 1: Introduction to Mathematical Modelling

- Unit 1 Mathematical Modelling – An Overview
- Unit 2 Model Formulation
- Unit 3 Data Analysis and Fitting Models to Data

Block 2: Mathematical Models in Biology and Economics

- Unit 4 Single Species Population Models
- Unit 5 Modelling Environmental
- Unit 6 Modelling in Medicine
- Unit 7 Socio-Economic Models

6. DETAILS OF ELECTIVE COURSES

1. Graph Theory (MMTE-001)

4 credits

Graph theory is a subject which is nearly 300 years old, but it has acquired importance as modelling tool in diverse branches of Science and Technology in the past 50 years. This course is an introduction to Graph Theory. This is a 4 credit course which included practical component worth 1 credit. In this course, graph theory is presented from an application point of view. Many graph theoretic algorithms dealing with colouring, network flow, finding the distance etc. are dealt with in this course. The course is developed as a **wrap-around** material around the book. **“Introduction to Graph Theory” by Douglas B. West**, (Second edition). In order to help you study the text book, study guide is developed which consists of eleven units. Each unit in these blocks is a guided tour through the relevant parts of the text book. The material consists of worked out examples, exercises, some applications and more explanations on some concepts in the book which we felt that you may find difficult to grasp. This course assumes the knowledge of linear algebra that is presented in IGNOU undergraduate course MTE-02. This course involves practical work to be done using C-programming. The practical component is worth 1-credit and the list of practical sessions are given at the end of Block 2 of the Study Guide.

Syllabus

Study Guide

Unit 1	Fundamental Concepts
Unit 2	Paths, Cycles and Trails
Unit 3	Vertex Degrees
Unit 4	Trees
Unit 5	Optimization and Trees
Unit 6	Matchings and Factors
Unit 7	Connectivity and Paths
Unit 8	Coloring of Graphs
Unit 9	Planar Graphs
Unit 10	Hamiltonian Cycles

2. Design and Analysis of Algorithms (MMTE-002)

4 credits

This is an introduction to the design and analysis of computer algorithms an important area of theoretical computer science which has a mathematical flavour. This course discusses algorithms for specific problems like string matching, network flow etc. and explains how to analyse them. This course doesn't have any practical component. The text book for the course is **“Introduction to algorithms”, by Cormen, Leiserson, Rivest and Stein, (Third Edition)**. The chapter number and section numbers given below refer to this book.

Syllabus

Block 1: Introduction to Design and Analysis

Unit 1	Introduction, Motivation and Mathematical Preliminaries, RAM model of computation, analysis of algorithms, average/worst case, correctness of algorithms, examples (Chapters 1, 2.1, 2.2, Chapter 3, 4.3, 4.4)
Unit 2	Quick Sort (7.1, 7.2, 7.3)
Unit 3	Sorting in Linear Time (8.2, 8.3)

Block 2: Data Structures and Applications

Unit 4	Binary Search Trees (12.1, 12.2, 12.3) (Omit TRANSPLANT)
Unit 5	B-trees (18.1, 18.2, 18.3)
Unit 6	Binary Heaps (Chapter 6)
Unit 7	Disjoint Sets (21.1 – 21.3)

Block 3: Design Techniques

- Unit 8 Divide and Conquer Strategy (2.3, 33.4)
- Unit 9 Dynamic Programming (15.1 – 15.4)
- Unit 10 Greedy Algorithms (16.1 – 16.3)

Block 4: Graph Algorithms

- Unit 11 Graph Search (22.1 – 22.4)
- Unit 12 Minimum Spanning Trees (Chapter 23)
- Unit 13 Shortest Paths (Chapter 24)
- Unit 14 Network Flow Algorithms (26.1, 26.2)

Block 5: Advanced Topics

- Unit 15 String Matching (32.1, 32.2)
- Unit 16 Number Theoretic Algorithms (31.1 – 31.7)
- Unit 17 Polynomials and Fast Fourier Transforms (30.1, 30.2)

3. Pattern Recognition & Image Processing (MMTE-003)**4 credits**

The course MMTE-003, Pattern Recognition and Image Processing, is an elective course of the M.Sc(MACS) programme and is worth 4 credits. This course has theory as well as practical component. The textbook for this course is:

Digital Image Processing, Third Edition
By Gonzalez, Woods
Publisher: Pearson Education

Image processing and pattern recognition are important fields which are advancing rapidly. These areas have lot of applications in Sciences and Technology like medical imaging, remote sensing, robotics etc. In this course topics like image digitization, image enhancement, and supervised/unsupervised learning image restoration are discussed. This course involves practical component worth 1-credit. These practicals are to be done with Sci-lab. The chapter number and section numbers given below refer to this book.

Syllabus

- Unit 1: Introduction; Image digitization; Image data compression. (Sec. 1.1, 1.2, 1.3, 1.4, 1.5)
- Unit 2: Transform domain coding; Predictive coding. (Sec. 8.1, 8.2, 8.3)
- Unit 3: Image enhancement; (Sec. 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)
- Unit 4: Filtering in the Frequency Domain. (Chapter 4)
- Unit 5: Image restoration. (Chapter 5)
- Unit 6: Algebraic reconstruction method; Image segmentation; Detection of discontinuities. (Sec. 10.1, 10.2, 10.3, 10.4, 10.5, 10.6)
- Unit 7: Edge linking and boundary detection; Thresholding; Region oriented segmentation. (Sec. 11.1, 11.2, 11.3)
- Unit 8: Introduction; pattern recognition components (different approaches); training/test sets. (Sec 12.1)
- Unit 9: Discriminant function (linear and nonlinear), Bayesian classification, (Sec. 12.2)

Unit 10: Supervised/unsupervised learning; Basic hierarchical and non-hierarchical clustering algorithms; Dimensionality reduction; Similarity measures; Feature selection criteria and algorithms; Principal components analysis. (Sec. 12.3, 11.4)

The details of the practical exercises to be done during the practical sessions of MMTE-003 are given below:

MMTE-003 (P) Pattern Recognition and Image Processing

Use Scilab 5.1.1, which is available at the study centre.

Session I

Try the functions and command given in the attached Tutorial.

Session II (Resolution, sampling and transform coding)

- (a) Load an image (e.g. tress or clown) in Scilab in gray shades. Change the number of gray levels to 64, 16, 8, 4, 2 to display the same image. Comment on the observation.
(b) Change the resolution of this image. Explain the effect of sampling error.
- Load an image. Find its Discrete Cosine Transform. Show the amount of compression that can be achieved without much degradation in the quality of reconstructed image.

Session III (Edge Detection and image enhancement)

- Take an image. Carry out edge detection in both directions using
 - Sobel operator
 - Prewitt operator
 - Roberts operatorDo not use in-built commands. Use the corresponding masks and then carry out edge detection.
- Take an image and pass it through a high pass filter and high boost filter. Comment on your observation.

Session IV (Frequency Domain properties of images)

- Display a sinusoidal pattern varying in
 - X – direction only
 - Y – direction only
 - In both X and Y direction only.
- Take a 256×256 image displaying a sinusoidal pattern varying in two dimension. Compute its 2 – D FFT and display the magnitude in the form of image. Vary the frequency of the sinusoidal signals keeping the same display area (resulting in change in sampling rate) and display the magnitude information of its FFT. Show the aliasing effect in the frequency domain. Also reconstruct the image using IFFT and see the change in pattern.

Session V (Restoration)

- Load an image. Choose a blurring function to blur this image and add noise to the blurred image. Now try to restore this image using
 - Wiener filter
 - Median filter.Comment on the result

4. Computer Graphics (MMTE-004)

2 credits

The field of computer graphics deals with methods and tools for generating images. It has applications in diverse areas as science, engineering, medicine, business, industry, art, entertainment, advertising, education and training etc. This two-credit course is developed as a **wrap-around** material around the book **“Computer Graphics” C-Version (second edition) by Donald Hearn and M. Pauline Baker**. The study guide developed for this course consists of five-units. It gives you an introduction to computer graphics. The different kinds of graphics display systems are described. It discusses algorithms for generating some

two and three dimensional shapes and transformations for these shapes. This course assumes the knowledge of undergraduate IGNOU courses on elementary algebra (MTE-04), geometry (MTE-05) and calculus (MTE-01). The course also involves practical work to be done using C-programming which you would have learnt in MMT-001. Practical exercises which are to be done are given at the end of Units 2, 3, 4, and 5 in the study guide.

Syllabus

Study Guide

Unit 1	An Overview of Hardware Primitives
Unit 2	2D Shape Primitives
Unit 3	More Output Primitives and Geometric Transformations
Unit 4	Clipping and 3D Primitives
Unit 5	Three Dimensional Transformations

5. Coding Theory (MMTE-005)

4 credits

This subject has its origins in a classic paper by Claude Shannon in 1948. In this paper he wrote, “*The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point.*” In telecommunication, and many other areas like computer networking, data has to be transferred from one point to another (for example, from a satellite to an earth station) in the form of bits, i.e., binary digits. Due to various disturbances, the message could get modified in transit; some of the 0s may become 1s and vice-versa. So, the message received at the destination may be different from the message sent. Coding theory provides tools and techniques for correcting the errors that appear during transmission. In this course, we provide an introduction to this subject.

The text book for this course is “**Fundamentals of Error-Correcting Codes**” by Vera Pless and W. Cary Huffman, Cambridge University Press. The Chapter number and section numbers given below refer to this book. The prerequisites for this course are an undergraduate course in Linear Algebra and an undergraduate course in Algebra, including an introduction to finite fields, covering at least the material in Chapter 13, Section 6 of Michael Artin’s book, “Algebra”. This course has practical component worth 1 credit.

Syllabus

Unit 1: Introduction to Basic Terminology

Basic definition and examples of alphabets, messages, Generator matrix, Parity check matrix, Dual of Code, Self-Dual Codes, weight and distances, new codes from old (Chapter 1, sections 1.1-1.5)

Unit 2: Examples of Codes, Encoding and Decoding

Perfect codes, Hamming codes, Golay Codes, Reed-Muller Codes, encoding, decoding include (syndrome decoding) (Chapter I, sections 1.6-1.11 and section 1.12, upto theorem 1.12.3)

Unit 3: Finite Fields.(Chapter 3, sections 3.1-3.7)

Unit 4: Cyclic Codes

Cyclic codes, Factorization of X^n-1 over F_q , Generator polynomial of a cyclic code and its dual, Minimum distance of cyclic codes (Chapter 4, sections 4.1-4.5)

Unit 5: BCH and Reed-Solomon codes

BCH Codes, Examples including Reed-Solomon Codes and its generalization, Decoding BCH Codes (Chapter 5, sections 5.1, 5.2, 5.3 and subsections 5.4.1, 5.4.2 of section 5.4)

Unit 6: Weight Distributions of Codes

Weight distribution of a code and Mac-williams identity, Statement of Gleason Theorem for weight enumerator polynomial and examples of the computation of weight enumerators (Chapter 7, sections 7.1-7.3)

Unit 7: Quadratic residue codes

Quadratic residue codes (Chapter 6, sections 6.1-6.5, and subsection 6.6.1)

Unit 8: Codes over Z_4

Codes over Z_4 (Chapter 12, sections 12.1-12.5)

Unit 9: Convolution codes

(Whole of chapter 14)
Unit 10: LDPC Codes and Turbo decoding
(Chapter 15, sections 15.3-15.8)

6. Cryptography (MMTE-006)

4 credits

Cryptography is the science of designing secure encryption methods for communication. Earlier, cryptography was of interest to a handful of people like diplomats and those in espionage and counter espionage. However, due to the growth of computer networks and specifically the Internet, this subject has become important from the point of view of data security in the computer networks. This course has three blocks. The first block provides an introduction to classical ciphers and some basics in mathematics. In the second block, the “traditional” symmetric ciphers are discussed. In the third block “two key ciphers” or public key cryptography is discussed. This course has practical component worth 1 credit.

Syllabus

Block 1: Cryptography Basics

- Unit 1 Algebra and Algorithms
- Unit 2 Number Theoretic Algorithms
- Unit 3 Classical Ciphers

Block 2: Block and Stream Ciphers

- Unit 4 Symmetric Key Block Ciphers
- Unit 5 Steam Ciphers
- Unit 6 Hash Functions

Block 3: Public-key Cryptography

- Unit 7 Public Key Encryption
- Unit 8 Digital Signatures
- Unit 9 Practical Sessions

7. Soft Computing and Its Applications (MMTE-007)

4 credits

“Soft Computing and its Applications” is a 4-credit course. This course involves theory component as well as practical component. In this course the three main components of soft computing, fuzzy logic, neural networks and genetic algorithms are presented with applications. The prerequisite dependency for this course is “Probability and Statistics”, (MMT-008) which you would have studied during the second semester of the programme. This course comprises four blocks related to soft computing. It begins with fuzzy set, and fuzzy C-mean algorithm in Block 1. The next two blocks discuss neural network with its applications. In the last block, the course concludes with several genetic algorithms. The practical assignments are listed at the end of corresponding unit.

Syllabus

Block 1: Fuzzy Sets

- Unit 1 Introduction to Fuzzy Set
- Unit 2 Fuzzy Mean Algorithms
- Unit 3 Applications of Fuzzy Set

Block 2: Neural Networks-I

- Unit 4 Introduction to Neural Networks
- Unit 5 Single-layer Perception
- Unit 6 Multi-layer Perception-I

Block 3: Neural Networks-II

- Unit 7 Multi-layer Perception-II
- Unit 8 Radial Basis Function Networks

- Unit 9 Hopfield Networks
- Unit 10 Kohonen's Networks

Block 4: Genetic Algorithms (GA)

- Unit 11 Description of Genetic Algorithms
- Unit 12 Applications of Genetic Algorithms
- Unit 13 Schema Theorem

8. Project Work (MMTP-001)

4 credits

This 4 credits worth of project work provides you an opportunity to get hands-on work experience in some Industry/Organisation/R&D establishments/Institution. A detailed project guide is developed to help you in doing the project work. The guide will give you various steps involved in doing a project. It indicates some of the possible types of projects which can be taken up. Depending upon the expertise and infrastructure available in your region, the Programme Facilitator at your programme centre will identify subject areas for doing projects. You are free to choose any area from these identified areas or you can even choose an area of your choice with the approval of your facilitator. The details regarding the format of project proposal and project report are given in the project guide.

7. LIST OF M.Sc. (MACS) PROGRAMME STUDY CENTRES

Sl. No.	RC Code / Name	Region	Programme Study Centre Code	Programme Study Centre Address	Name of the Programme Facilitator/Incharge
1.	14 Cochin	South	1478-P	St. Paul's College Dept. of Mathematics Kalamassery Ernakulam Kerala-683 503	Dr. Manju K. Menon manjumenonk@gmail.com manjumenon@cusat.ac.in 09846335837 (Mob.)
2.	25 Chennai	South	2578	Guru Nanak College Velachery Road Chennai Tamilnadu-600 042	Dr. Sadanand Patra ignougnsc@gmail.com 09445172722 (Mob.) 044-22446472
3.	39 Noida	North	07107	Maharaja Agrasen College Vashundhara Enclave Delhi – 110 096	Dr. T. N. Ojha drtnodu@gmail.com drtnodu@yahoo.com 8800366664, 9810049875
4.	32 Ranchi	East	3645-P	Marwari College Dept. of Mathematics Lake Road, Hindpiri Ranchi Jharkhand-834 001	Dr. B. P. Verma bpv129@yahoo.com drbpverma@gmail.com 09431877584 (Mob.)
5.	28 Kolkata	East	2810	Maulana Azad College 8 Dharamtala, R A Kidwai Road Kolkata West Bengal-700 012	Prof. D. C. Ghosh 09831857743 (Mob.)
6.	15 Jabalpur	West	1502	R. D. V. V. University Rajshekhher Bhavan Art's Block, 2 nd Floor Pachpedi, Jabalpur Madhya Pradesh-482 001	Prof. Vivek Misra vivekmisra3@gmail.com 08463012364 (Mob.) 09425483652 (Mob.)
7.	16 Pune	West	1675-P	University of Pune Dept. of Mathematics Ganeshkhind Road Pune Maharashtra-411 007	Prof. Waphare Balu Nathaji bnwaph@math.unipune.ernet.in 09420179163 (Mob.) 020-25692615 (O)

8. IGNOU REGIONAL CENTRES

Sl. No	Regional Centres	RC Code	Address	Regional Directors
01	Ahmedabad	09	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE OPP. NIRMA UNIVERSITY SARKHEJ-GANDHINAGAR HIGHWAY, CHHARODI AHMEDABAD - 382 481 GUJARAT 02717-242975-242976 02717-241579/02717-241580 rcahmedbad@ignou.ac.in	Dr. Avani Trivedi (Regional Director)
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12	Dehradun	31	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE NANOOR KHERA, TAPOVAN RAIPUR ROAD DEHRADUN - 248 008 UTTARAKHAND 0135-2789200 0135-2789190 rcdehradun@ignou.ac.in	Dr. Asha Sharma (Regional Director) Dr. Anil Kumar Dimri, (Regional Director)
13	Delhi-1	07	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE PLOT NO J-2-1 BLOCK - B 1 MOHAN COOPERATIVE INDUSTRIAL ESTATE, MATHURA ROAD NEW DELHI - 110 044 DELHI 011-26990082 /26990082-83 011-26990084 rcdelhi1@ignou.ac.in	Dr. Gulab Jha (Regional Director)
14	Delhi-2 (Rajghat)	29	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE GANDHI SMRITI & DARSHAN SAMITI RAJGHAT NEW DELHI - 110 002 DELHI 011-23392374 /23392376 23392377 / 23392737 011-23392375 rcdelhi2@ignou.ac.in	Dr. Sanjeev Pandey, (Regional Director) Dr. M.A. Lashkar (ARD Sr. Most)
15	Delhi-3 (Dwaraka)	38	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE F-634-636 PALAM EXTENSION RAM PHAL CHOWK (NEAR SECTOR 7) DWARKA NEW DELHI - 110 045 DELHI 011-25088964/011-25088983 rcdelhi3@ignou.ac.in	Dr. C. K. Ghosh (Sr. Regional Director)
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17	Hyderabad	01	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE PLOT NO 207, KAVURI HILLS PHASE II, NEAR MADHAPUR PS, JUBILEE HILLS (P.O.) HYDERABAD - 500 033 ANDHRA PRADESH 040-23117550-53 040-23117554 rchyderabad@ignou.ac.in	Dr. P. Ashok Kumar (Regional Director)
18	Jabalpur	41	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 2ND FLOOR, RAJSHEKHAR BHAVAN RANI DURGAVATI VISHVAVIDYALAYA CAMPUS, PACHPEDHI JABALPUR - 482 001 MADHYA PRADESH 0761-2600411 /2609896 2600219 0761-2609919 rcjabalpur@ignou.ac.in	Dr. U C Pandey (Regional Director) Dr. Vivek Shrivastava ARD
19	Jaipur	23	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 70/79, SECTOR - 7 PATEL MARG MANSAROVAR JAIPUR - 302 020 RAJASTHAN 0141-2785730 / 2785750 0141-2396427/0141-2784043 rcjaipur@ignou.ac.in	Dr. M. K. Dash (Regional Director)
20	Jammu	12	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE SPMR COLLEGE OF COMMERCE AUROBINDO BLOCK 1ST FLOOR CANAL ROAD JAMMU - 180 001 JAMMU & KASHMIR 0191-2579572 / 2546529 0191-2561154 rcjammu@ignou.ac.in	Dr. K.K. Bhatt (Regional Director)
21	Jodhpur	88	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE PLOT NO. 439 PAL LINK ROAD OPP. KAMALA NAGAR HOSPITAL JODHPUR RAJASTHAN 342008 0291-2012986 0291-2980469 rcjodhpur@ignou.ac.in studentsrcjodhpur@ignou.ac.in	Dr. Mamta Bhatia (Regional Director) (I/C)

22	Karnal	10	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 06 SUBHASH COLONY NEAR HOME GUARD OFFICE KARNAL - 132 001 HARYANA 0184-2271514 / 2260075 0184-2255738 rckarnal@ignou.ac.in	Dr. Ashok Sharma (Regional Director)
23	Khanna	22	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE I.T.I. BUILDING BULEPUR (DISTRICT LUDHIANA) KHANNA - 141 401 PUNJAB 01628-229993 / 237361 01628-238284 rckhanna@ignou.ac.in	Dr. Santosh Kumari (Regional Director)
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25	Koraput	44	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE DISTRICT AGRICULTURE OFFICE RD BEHIND WOMEN'S COLLEGE AT/PO/DISTT.-KORAPUT ORISSA-764 020 06852-251535/06852-251535 06852-252503 rckoraput@ignou.ac.in	Dr. S. K. Tripathy (Regional Director)
26	Lucknow	27	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 5-C/INS-1, SECTOR - 5 VRINDAVAN YOJNA, TELIBAGH LUCKNOW-226 029 UTTAR PRADESH rclucknow@ignou.ac.in	Dr. Manorama Singh (Regional Director) Dr. Ashwini Kumar (Deputy Director)

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29	Nagpur	36	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE GYAN VATIKA 14 HINDUSTAN COLONY AMARAVATI ROAD NAGPUR - 440 033 MAHARASHTRA 0712-2536999,2537999 0712-2022000 0712-2538999 rcnagpur@ignou.ac.in	Dr. P Sivaswaroop (Regional Director) 09923993311
30	Noida	39	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE C-53 SECTOR 62 INSTITUTIONAL AREA NOIDA - 201 305 UTTAR PRADESH 0120-2405012 / 2405014 0120-2405013 rcnoida@ignou.ac.in	Dr. S. S. Jena (Regional Director) 09910075392
31	Panaji	08	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE H. NO. 1576 NEAR P&T STAFF QUARTERS ALTO PORVORIM P.O. GOA-403 521 0832-2414553 0832-2414550 rcpanaji@ignou.ac.in	Dr. Kameshwari Moorty (Regional Director) 09764425250

32	Patna	05	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 06 SUBHASH COLONY NEAR HOME GUARD OFFICE KARNAL - 132 001 HARYANA 0184-2271514 / 2260075 0184-2255738 rckarnal@ignou.ac.in	Dr. Qaseemuddin Haider (Regional Director) 08987038880
33	Port Blair	02	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE KANNADA SANGHA BUILDING NEAR SYNDICATE BANK 18, TAGORE ROAD, MOHANPURA PORT BLAIR - 744 101 ANDAMAN & NICOBAR ISLANDS 03192-242888 / 230111 03192-230111 rportblair@ignou.ac.in	Dr. S Vijayaragavan (ARD) (I/C) 09434289907
34	Pune	16	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE MSFC BUILDING, 1ST FLOOR 270, SENAPATI BAPAT ROAD PUNE - 411 016 MAHARASHTRA 020-25671867 / 25651321 020-25671864 rcpune@ignou.ac.in	Dr. Massod Parveez (Sr. Regional Director) 08989536219
35	Raipur	35	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE IGNOU COMPLEX HOUSING BOARD COLONY, KACHNA, POST: SADDU RAIPUR - 492 014 CHHATTISGARH 0771-2428285 / 5056508 0771-2445839/0771-2445839 rcraipur@ignou.ac.in	Dr.H.Sangeeta Majhi (Regional Director) 09424203734
36	Raghunathganj	50	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE BAGAN BARI NEAR DENA BANK, FULTALA MURSHIDABAD RAGHUNATHGANJ WEST BENGAL-742 225 03483-271555 / 271666 03483-271666/03483-271666 rcraghunathganj@ignou.ac.in	Dr. S. Srinivas (Regional Director) 09531830920
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40	Shimla	11	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE CHAUHAN NIWAS BUILDING, KHALINI SHIMLA-171 002 HIMACHAL PRADESH 0177-2624612 / 2624613 0177-2624611 rcshimla@ignou.ac.in	Dr. Punam K. Singh (Regional Director) 09459981565
41	Siliguri	45	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 17/12 J C BOSE ROAD SUBHAS PALLY SILIGURI - 734 001 WEST BENGAL 0353-2526818/2526819 0353-2526829/0353-2526829 rcsiliguri@ignou.ac.in rcsiliguri45@gmail.com	Dr. Biswajit Bhowmik (Deputy Director) RC (I/C) 09434466968
42	Srinagar	30	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE NEAR LAWRENCE VIDHYA BHAWAN KURSU RAJ BAGH SRINAGAR - 190 008 JAMMU & KASHMIR 0194-2311251/0194-2311258 0194-2311259 rcsrinagar@ignou.ac.in	Dr. Nurul Hasan (ARD) (I/C) 09419016936
43	Thiruvananthapuram	40	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE RAJADHANI COMPLEX OPP PRS HOSPITAL KILLIPPALAM KARAMANA PO TRIVANDRUM - 695 002 KERALA 0471-2344113/2344120 0471-2344115/0471-2344121 rctrivandrum@ignou.ac.in	Dr. V. Girija Devi (Regional Director) 09497721251

44	Varanasi	48	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE GANDHI BHAWAN B.H.U. CAMPUS VARANASI-221005 UTTAR PRADESH 0542-2368022 / 2368622 0522-2364893 0542-2369629 rcvaranasi@ignou.ac.in	Dr. A. N. Tripathi (Regional Director) 09453219906
45	Vatakara	83	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE NUT STREET (PO) VATAKARA KOZHIKODE-873104 KERALA 0496-2525281 0496-2515413 rcvatakara@ignou.ac.in	Dr. K. Panneerselvam (Regional Director) 09725000124 Dr. Seetha Kakkoth ARD 09400582022
46	Vijaywada	33	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE SKPVV HINDU HIGH SCHOOL KOTHAPET VIJAYAWADA-520 001 ANDHRAPRADESH 0866-2565253 / 2565959 0866-2565253 0866-2565353 rcvijayawada@ignou.ac.in	Dr. B. Rajagopal (Regional Director) 09492036146
47	Vishakhapatnam	84	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 2ND FLOOR VUDA COMPLEX SECTOR-12, MVP COLONY USHODAYA JUNCTION VISAKHAPATNAM-530017 ANDHRA PRADESH 0891-2511200 0891-2511300 rcvisakhapatnam@ignou.ac.in	Dr. S. Raja Rao (Regional Director) 09491198622

NORTH EAST Regional Centres

01	Agartala	26	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE M.B.B. COLLEGE COMPOUND P.O. AGARTALA COLLEGE AGARTALA - 799 004 TRIPURA 0381-2519391 0381-2516266 rcagartala@ignou.ac.in	Ms.Namrata Hagier, (Regional Director) (I/C) 09436503480
02	Aizwal	19	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE HOUSE NO. C-4/5 R. HAUTLUANGA BUILDING UPPER REPUBLIC AIZWAL - 796 001 MIZORAM 0389-2311693 / 2311692 0389-2311789 rcaizwal@ignou.ac.in	Dr. S. R. Zonunthara (Regional Director) 09436151784
03	Gangtok	24	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 5TH MILE TADONG NH-31A, BELOW CENTRAL REFERAL HOSPITAL, EAST SIKKIM GANKTOK - 737 102 SIKKIM 0359-231102/270923 0359-231103 rcgangtok@ignou.ac.in	Dr. Yonah Bhutia (Regional Director) 09832093223
04	Guwahati	04	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE HOUSE NO 71, GMCH ROAD CHRISTIAN BASTI GUWAHATI-781005 ASSAM 0361-2343771 / 2343785 0361-2343786 0361-2343784 rcguwahati@ignou.ac.in	Dr. Ila Das (Regional Director) 09401250087
05	Imphal	17	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE ASHA JINA COMPLEX NORTH AOC IMPHAL - 795 001 MANIPUR 0385-2421190 / 2421191 0385-2421192 rcimphal@ignou.ac.in	Dr. Salam Dilan Singh (Regional Director) 09856081449

06	Itanagar	03	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE 'HORNHILL COMPLEX' 'C' SECTOR (NEAR CENTRAL SCH.) NAHARLAGUN ITANAGAR - 791 110 ARUNACHAL PRADESH 0360-23517051/2247536 0360-2350990 rcitanagar@ignou.ac.in	Dr. D. J. Kuba (Regional Director) (I/C) 09436272094
07	Jorhat		REGINOAL DIRECTOR IGNOU REGIONAL CENTRE JANAMBHUMI BUILDING TULSHI NARAYAN SARMAH PATH NEAR NEHRU PARK JORHAT - 785001 ASSAM rcjorhat@ignou.ac.in 0376-2301116 0376-2301115 0376-2301114	Dr. Anil Chand Borah (Deputy Director) (I/C) 09435300316
08	Kohima	20	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE NEAR MOUNT HERMON SCHOOL DON BOSCO HR.SEC SCHOOL ROAD KENDOUZOU KOHIMA - 797 001 NAGALAND 0370-2260366 / 2260167 0370-2260216 rckohima@ignou.ac.in	Dr. T. Iralu (Regional Director) 09436006683
09	Shillong	18	REGIONAL DIRECTOR IGNOU REGIONAL CENTRE SUNNY LODGE NONGTHYMMI NONGSHILLIANG SHILLONG - 793 014 MEGHALAYA 0364-2521117 / 2521271 0364-2520503 0364-2521271 rcshillong@ignou.ac.in	Dr. A. S. Guha (Regional Director) 09436706305