MPhil in Mathematics

Programme Description

The MPhil programme aims to introduce students to already existing areas of research. While an MPhil student will not be required to produce original research, an exceptional student may do so. The goal however is to provide a platform where the students get immersed into research and research methods which may help them decide whether they would like to then pursue a doctoral programme.

A secondary aim of MPhil programme is also to create an environment that will enable research students to learn and immerse themselves into the pedagogical aspects of mathematics.

The MPhil programme in Mathematics will provide a prospective student a foundation in research and research techniques. It will also provide a base for practical teaching experience. However, an MPhil degree may or may not lead to a doctoral degree and that too not necessarily in the same area.

Programme Structure

A student admitted to the **MPhil programme** in Mathematics will have to complete four core courses, two elective courses and one Research Methodology Course.

The total coursework will be worth 16 credits. After successfully completing the course work a student will have to write and submit a Dissertation and also be involved in teaching undergraduates via the Teaching Practicum.

Semester	Semester I	Semester II			Semester III and IV
Course Work	4 Core Courses	Elective I	Elective II	Research Methodology	Teaching Practicum and Dissertation
Credits	8	3	3	2	

Teaching Practicum

A student admitted to the MPhil programme, will participate in teaching undergraduates under the mentorship of their assigned supervisor. This will take place typically during the 3rd and 4th semesters for an MPhil student after they have successfully completed their coursework. The student will have to make a presentation to the Mathematics Faculty (SLS) at the end of each semester, analysing their experience of teaching at the undergraduate level. Feedback will also be taken from the students of the UG course on the teaching performance of the MPhil student. While the teaching practicum is mandatory there is no credit weightage or assessment associated with it but will be treated as part of the essential requirements of completing an MPhil programme.

Broad research themes

The broad research areas are Algebra, Analysis, Algebraic Number Theory and Mathematical Modelling and Simulation. Within these broad areas, research can be pursued in sub-areas such as Group Theory, Ring Theory, Linear Algebra, Complex Analysis, Valuation Theory, Artificial Neural Networks and Mathematical Modelling.

MPhil level courses

S. No.	Course Name	Core/Elective	Credits
1.	Group Theory	Core	2
2.	Commutative Algebra	Core	2
3.	Linear Algebra and Matrix Theory	Core	2
4.	Algebraic Number Theory	Core	2
5.	Module Theory	Core	2
6.	Functional Analysis	Core	2
7.	Differential and Integral Equations	Core	2
8.	Geometric Function Theory	Core	2
9.	Generalized Hypergeometric Functions and Fractional Calculus	Core	2
10.	Topology	Core	2
11.	Operator Theory	Core	2
12.	Representation Theory of Finite Groups	Elective	3
13.	Advanced Group Theory	Elective	3
14.	Generalized Inverses and Applications	Elective	3
15.	Valuation Theory	Elective	3
16.	Group Rings	Elective	3
17.	Lie Algebras	Elective	3
18.	Fractional Differential Equations	Elective	3
19.	Mathematical Inequalities	Elective	3
20.	Mathematical Modelling	Elective	3
21.	Numerical Analysis	Elective	3

The list of Core and Elective Courses can be expanded depending on research interests of the Mathematics Faculty. Each year, four courses will be offered from the two categories listed below with the caveat that, at least one course each, will certainly be offered from each of the two categories listed below.

Category 1: core courses 1-5, Category 2: core Courses 6-11.

Eligibility

Candidates seeking admission in MPhil programme must have completed MA/MSc from a recognised University/Institute in Mathematics or a related subject with 55% marks or an equivalent grade. A relaxation in marks of 5% or an equivalent relaxation of grade is allowed for those belonging to SC/ST/OBC (non creamy layer, Delhi)/ differently-abled categories (DOPT/UGC list).

Meeting the eligibility criteria alone will not ensure admission.

Faculty

1. Geetha Venkatraman (DPhil, University of Oxford), Professor

   Geetha did her MA and DPhil (doctorate) in Mathematics at the University of Oxford.
   Her area of research is finite group theory. She has published research in enumeration of finite groups, classification of finite groups using properties related to order of elements, conjugacy classes, subgroups etc. She is a coauthor of a research monograph titled *Enumeration of finite groups*, published by Cambridge University Press, UK. Sage Publications India will publish her second co-authored book, titled, A Bridge to Mathematics, later this year. She has also published several articles related to education, with an emphasis on undergraduate education. Apart from her interest in Group Theory and related areas she is deeply interested in popularising mathematics, mathematics education and issues related to women in mathematics. She has given several research talks and popular talks on mathematics in India and other countries to a varied audience ranging from middle and high school children, school teachers and mathematicians. For more details see:
   http://www.aud.ac.in/faculty/permanent-faculty/detail/87
   https://aud-in.academia.edu/GeethaVenkataraman

2. Ramneek Khassa (PhD, Punjab University), Assistant Professor

   Ramneek She did her MSc and PhD in Mathematics from Panjab University, Chandigarh. Her area of research is valuation theory. She has published research papers in her area of research, the details of which can be found on the link below:

   http://aud.ac.in/faculty/permanent-faculty/detail/191

3. Pranay Goswami (PhD, University of Rajasthan), Assistant Professor

   Pranay completed his Doctoral degree from University of Rajasthan in 2011. His area of interest includes fractional differential and integral equations, univalent and multivalent functions, mathematical modelling. He has published several research papers in his areas of interests. Apart from that he is working as reviewer of several journals of national and international repute. For more details see:
   http://aud.ac.in/faculty/permanent-faculty/detail/168
   https://www.researchgate.net/profile/Pranay_Goswami
   https://scholar.google.co.in/citations?user=2t_F1_sAAAAJ&hl=en

4. Balchand Prajapati (PhD, IIT Delhi), Assistant Professor

   Balchand Prajapati did his MSc in Mathematics from Banaras Hindu University, Varanasi and PhD in Mathematics (Algebra) from Indian Institute of Technology, Delhi. Before joining AUD Balchand was a Visiting Faculty at Birla Institute of Technology and Science, Goa Campus.His area of research is rings and group rings. His research focuses on finding the structure of rings and group rings with the help of derivations and automorphisms. He has published several papers in his area of research. Currently he has a research project entitled "Derivation On Group Algebra And Its Application" funded by Department of Science and Technology, Govt. of India. For more details see:
   http://aud.ac.in/faculty/permanent-faculty/detail/167
   https://www.researchgate.net/profile/Balchand_Prajapati

5. Kranti Kumar (PhD, IIT Roorkee), Assistant Professor

    Kranti Kumar completed his Doctoral degree in Mathematics from Indian Institute of Technology Roorkee in 2013. His research interest includes noise pollution modeling, traffic flow modeling, differential equations and Artificial Neural Networks. Currently he is working on the UGC sponsored research project entitled "Modeling and simulation of vehicular traffic flow problems". For more details see:
    http://aud.ac.in/faculty/permanent-faculty/detail/152
    https://www.researchgate.net/profile/Kranti_Kumar3/publications
    https://scholar.google.co.in/citations?user=sNjiB38AAAAJ&hl=en

Fee structure

Rs. 1450 per credit for Course Work or Rs. 5510 per semester during Research/ Dissertation + Rs. 500 per semester for Student Welfare Fund + Rs. 5,000 as refundable Security Deposit.

SC/ST and Differently abled research scholars will be fully exempt from paying tuition fee. For others, partial/ full fee waivers are available based on income status.

Admission Procedure

Any candidate with a postgraduate degree in Mathematics or an allied subject from a recognised University can apply for admission and as per AUD rules.

At the time of the application the candidate will be expected to submit a statement of purpose.

Statement of Purpose (SOP): It should include a well articulated argument as to why the candidate wishes to pursue research at AUD. It should also include details on the area/s in mathematics in which the candidate wishes to pursue research. The SOP should not exceed 500 words. **Candidates' proposed research areas should be aligned with the specialisations of SLS (Mathematics) faculty.** Applicants are therefore encouraged to consult faculty profiles on the AUD website.

Entrance Test: Candidates for the MPhil programme will have to take an entrance exam which will be based broadly on a Masters level curriculum in Mathematics. Detailed syllabus and sample questions for the entrance exam can be seen at www.aud.ac.in/admission2017.

Interview: Only candidates qualifying in the written exam/s will be called for the interview. The interview shall be based broadly on a Master's level curriculum, the written exam/s and the statement of purpose submitted.

A provisional admission to the MPhil programme will then be offered to the candidates on the basis of combined merit in the written entrance exam and interview with 75% weightage for written exam and 25% in interview.