



A SHORT COURSE ON MODULAR FORMS

(Under MHRD Scheme on Global Initiative of Academic Networks (GIAN))

Department of Mathematics

Indian Institute of Science Education and Research Bhopal

August 24 – September 3, 2016

Overview

The subject of modular forms is central to several branches of mathematics, ranging from number theory, algebraic geometry, representation theory, and complex analysis. It also has intimate connections to theoretical physics. The celebrated Fermat's last theorem could not have been solved without this theory. The new techniques and tools introduced in the last thirty years make a basic understanding of the theory of modular forms indispensable for any graduate student of pure mathematics.

The format will be as follows: each morning, there will be a lecture on the topics listed below for about 1.5 hours. In the afternoon, there will be a tutorial of about 2 hours long, indicating how one applies the theoretical knowledge of the morning lecture to concrete problems. Lectures will be given by Prof. Ram Murty.

Lecture Schedule	<p>Lecture 1: q-series (Aug 24) Lecture 2: The modular group (Aug 25) Lecture 3: The upper half-plane (Aug 26) Lecture 4: Modular forms of level one (Aug 27) Lecture 5: The Ramanujan τ-function (Aug 28) Lecture 6: Modular forms of higher level (Aug 30) Lecture 7: Petersson inner product (Aug 31) Lecture 8: Hecke operators of higher level (Sept 1) Lecture 9: Dirichlet series and modular forms (Sept 2) Lecture 10: Special topics (Sept 3)</p> <p>In addition to the evaluation based on the tutorials, an exam will be conducted on the day after lectures are completed. The text for the course is "Problems in the theory of modular forms" by M. Ram Murty, M. Dewar and H. Graves, which is Volume 1 of the Lecture Notes series of the IMSc, Chennai, India.</p>
Eligibility	<p>The course is primarily aimed at Master's and Ph.D. students with appropriate background and interest. However, candidates with a Bachelor's degree who have a strong background may also apply.</p>
Prerequisites	<p>The necessary prerequisites for the participants are as follows :</p> <ul style="list-style-type: none">• Complex Analysis• Linear Algebra• Group Theory

	<ul style="list-style-type: none"> • Ring Theory <p>Additionally, some exposure to Basic Number Theory is also encouraged.</p>
Application procedure	<p>All interested candidates will have to apply online at : http://gian.iiserb.ac.in</p> <p>Student applicants should arrange for a letter of recommendation and copies of transcripts to be sent to : mathsconf@iiserb.ac.in</p>
Registration Fee	<p>Participants from abroad : US \$100 Academic Institutions: Rs. 500/- The above fee includes all instructional materials.</p>
Accommodation	<p>Accommodation will be available to the selected participants in the IISER Bhopal students hostel on shared basis.</p>
Important Dates	<ul style="list-style-type: none"> • May 23, 2016 : Last Date for accepting applications for participation • May 30, 2016 : Announcement of names of selected participants • Aug 24, 2016 : Registration and commencement of the course

About the Speaker



Prof. M. Ram Murty obtained his PhD in 1980 from the Massachusetts Institute of Technology (MIT) specializing in number theory. After post-doctoral fellowships at the Institute for Advanced Study in Princeton and the Tata Institute of Fundamental Research (TIFR) in Mumbai, he joined the faculty of McGill University in Montreal, Canada in 1982. In 1990, he was elected Fellow of the Royal Society of Canada and in 1996 was awarded the Balaguer Prize (along with his brother Kumar Murty) for the monograph Non-vanishing of L-functions and applications published by Birkhauser-Verlag. He is also a recipient of the Coxeter-James Prize (1988), Jeffery-Williams prize (2003), Queen's Research Prize (2003) as well as Killiam and Simons fellowships. In 1996, he moved to Queen's University where he is now the Queen's Research Chair and Head of Department of Mathematics and Statistics. He is cross-appointed as a Professor in the Department of Philosophy at Queen's. Prof. Murty is an elected Fellow of the Fields Institute in Toronto, the National Academy of Sciences (India), the Indian National Science Academy (INSA) and the American Mathematical Society (AMS). He is an adjunct professor at McGill University (Montreal), Harish-Chandra Research Institute (Allahabad), Institute for Mathematical Sciences (Chennai), Chennai Mathematical Institute (Chennai), Indian Institute of Technology (Mumbai) and Tata Institute for Fundamental Research (TIFR, Mumbai). He has written 10 books and nearly 200 research papers in mathematics.

Course Coordinator

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