

Transcendental Numbers and Special Values of Dirichlet Series

Overview

A complex number is said to be a transcendental number if it is not a root of any monic polynomial with rational coefficients. The primary goal of this course is to give an efficacious introduction to some of the beautiful theorems about transcendental numbers. The course begins with some earliest transcendence theorems such as Hermite's theorem of transcendence of e and Lindemann's theorem about the transcendence of the mathematical constant π and thereafter move to the Schneider-Lang theorem. Then we will introduce some of the essential features of the theory of elliptic functions and elliptic integrals so that the participants can appreciate the beauty of the primary applications. The final part of this course includes Baker's theorem about linear forms in logarithms of algebraic numbers, a theorem of Baker, Birch and Wirsing and their applications to the transcendence of special values of L-functions.

Course Objectives

- i) Exposing participants to the fundamentals of Transcendental Number Theory.
- ii) Providing exposure to the fundamental ideas/questions in the field of transcendence theory.
- iii) Building in confidence and capability amongst the participants so that they can understand applications of linear forms in logarithms with full details.
- iv) Enhancing the capability of the participants to identify and solve research problems.

Modules	<ul style="list-style-type: none"> • Duration:- One week (6 days), Start date: December 16, 2017 • Total Contact Hours: 18 hours: 2 hours lectures/day, 1 hour tutorial/day, over 1-week
Course Outline	<ul style="list-style-type: none"> • Hermite-Lindemann theorem, Lindemann-Weierstrass theorem, Six exponentials theorem, Schneider-Lang theorem, Elliptic functions and elliptic integrals • Baker's theorem and applications, Baker-Birch-Wirsing theorem, . Transcendence values of Dirichlet series, Transcendence of certain infinite series, Schanuel's conjecture and future directions
You Should Attend If...	<ul style="list-style-type: none"> • You are a student, at the levels (M.Sc/M.Phil/Ph.D.) • You are a postdoc or faculty from academic and technical institutions
Fees	<p>Registration Fees</p> <ul style="list-style-type: none"> • Participants from abroad: US \$100 • Students/Postdocs: Rs. 1000/- • Faculties: Rs. 2000/- <p>The above fee include computer use for tutorials, 24 hours free Internet facility. The participants will be provided with accommodation on payment basis.</p>
Mode of Registration	<p>All prospective participants need to do web registration for the course on GIAN (http://www.gian.iitkgp.ac.in/GREGN/index) portal by making a onetime non-refundable payment of Rs. 500/-. After the mandatory web registration, only the shortlisted participants will be informed by email to register for the course by making full payment of the course registration fee either by NEFT (Account holder name: The Registrar, IIT Ropar; Account no: 30836125653; IFSC Code: SBIN0013181; Bank: SBI; Branch Name: IIT Ropar) or by sending a demand draft in favour of “Registrar, IIT Ropar” payable at Rupnagar-140001, Punjab before the last date of registration. Please send an email to course coordinator in case of any questions: tapasc@iitrpr.ac.in</p>

The Faculty



Professor M Ram Murty, FRSC, FNA, FNASc is an Indo-Canadian mathematician, Ex-head of the Department of Mathematics and Statistics at Queen's University, where he holds Queen's Research Chair in mathematics. He graduated with a B.Sc. from Carleton University in 1976 and received his Ph.D. from the Massachusetts Institute of Technology (MIT) under the supervision of Harold Stark and Dorian Goldfeld in 1980. He was on the faculty of McGill University from 1982 until 1996, when he joined Queen's University.

He was elected a Fellow of the Royal Society of Canada in 1990, Fellow of the Fields Institute in 2003, Fellow of the American Mathematical Society in 2012. He was also elected to the National Academy of Science in 2007 and Indian National Science Academy (INSA) in 2008. He won numerous prestigious awards in mathematics including the Coxeter-James Prize (1988), Balaguer Prize (1996), Jeffery-Williams Prize (2003), Simons Fellowship etc. Specializing in Number theory, he is a researcher in the areas of Elliptic Curves, Analytic and Algebraic Theory of Numbers, Transcendence Theory, Automorphic Forms, Langlands Program, Selberg's Conjectures, Sieve Methods, Cryptography etc. He has Erdős number 1 and has collaborated over fifty of other researchers. He has published more than 200 research papers in the world top journals including Annals of Mathematics and Inventiones Mathematicae. He has supervised over 20 M.Sc students, 20 Ph.D students and 50 post-doctoral fellows.



Dr. Tapas Chatterjee is currently working as an Assistant Professor in the Department of Mathematics at Indian Institute of Technology Ropar, India. He obtained his Doctoral degree from the Institute of Mathematical Sciences, Chennai, India. After obtaining his Doctoral degree he joined as a Post-Doctoral Fellow in the Department of Mathematics & Statistics at Queen's University, Kingston, Canada. He was also a visiting researcher at the Institute for Computational and Experimental Research in Mathematics (ICERM, Brown University) and a visiting faculty at the Université Pierre et Marie Curie, University of Paris VI, France. His research is focused on various topics in Number Theory including Transcendence Theory and Special Values of L-functions.

Course Co-ordinator

Tapas Chatterjee, Ph.D.

Assistant Professor

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