Influence of Ramanujan in Number Theory

(A course under **Global Initiative of Academic Networks (GIAN))**

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Overview

Indian mathematical genius Srinivasa Ramanujan (1887--1920) made remarkable contributions in several areas of mathematics, including Number Theory. He revolutionalized the study of some areas of number theory by making great contributions. For example, Theory of Partitions, Ramanujan's tau function, The Rogers-Ramanujan Continued Fractions, and so on. Most of his research work on Number Theory arose out of *q*-series and theta functions. He developed his own theory of elliptic functions, and applied his theory to develop some truly different areas, like, hypergeometric-like series for *1/pi*, class invariants, continued fractions and many more. The purpose of this course is to give the participants, especially students and teachers, an exposure to Ramanujan's theory of *q*-series and theta functions with applications to various problems of number theory and related areas.

The proposed course will mainly cover the following topics:

- Ramanujan: Life and a brief overview of his contributions in various fields, his earlier notebooks, the lost notebook and his famous papers.
- *q*-series, theta functions and related topics and applications to number theory.
- The Rogers-Ramanujan functions and continued fractions.
- Hypergeometric series, elliptic curves and supercongruences.
- Ramanujan's contributions to partition theory, famous congruences, rank and crank.
- Ramanujan's mock theta functions and some recent developments.

Duration	**July 25 – August 6, 2016** **Number of participants for the course will be limited to fifty.**
You Should Attend If…	▪ you are a student or faculty from academic institution interested to learn the influence of Ramanujan in Number Theory. ▪ you are interested to learn the fundamentals of *q*-series and theta functions and applications to Number Theory. ▪ you are a college/university teacher interested to have an exposure to some specified topics of mathematics, specially, of number theory, that are not usually covered in a usual college /university course. ▪ you are interested to pursue a research career in areas of mathematics influenced by Ramanujan.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: Rs. 10,000.00** **Faculty from Academic Institutions: Rs. 5,000.00** **Research Scholars: Rs. 3,000.00** **PG Students: Rs. 1,000.00** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis in the University Guest House (current official rate is Rs.500/- per day for single occupancy; Rs.400/- per day for double occupancy and Rs.300/- per day in the dormitory of the guest house) and outstation research scholars/PG students will be accommodated in the University hostels (current official rate is Rs. 150/- per day with bed roll).

The Faculty

Prof. Bruce C. Berndt is in the Department of Mathematics, University of Illinois at Urbana-Champaign, USA. Prof. Berndt is a renowned expert on Ramanujan's life and work. Since 1977 he has devoted almost all of his research energy toward finding proofs for the claims made by Ramanujan in his (earlier) notebooks and the lost notebook. He completed editing the original three notebooks of Ramanujan and has written five volumes of *Ramanujan's Notebooks, Part I (1985), Part II (1989), Part III (1991), Part IV (1994), Part V (1998*) published by Springer. He has been editing Ramanujan's so-called "Lost Notebook," jointly with Prof. George E. Andrews of Pennsylvania State University. The first four volumes *Ramanujan's Lost Notebook, Part I (2005), Part II (2009), Part III (2012), Part IV (2013)* of projected 5/6 volumes have already been published by Springer. Till date, thirty four (34) students have received their Ph.D. degrees under his supervision and almost all of them worked on the areas of mathematics influenced by Ramanujan. So far, Prof. Berndt has published more than 230 papers, 14 books out of which 12 are on Ramanujan's work, including 9 books already mentioned above. He also edited 13 books. For the first four volumes of his "Ramanujan's Notebooks, Part I—IV," he was awarded ***Leroy P. Steele Prize for Mathematical Exposition*** by the American Mathematical Society in 1996. Some other honors/awards received by Prof. Berndt for his work are: Allendorfer Award, Mathematics Association of America (1979), Lester Ford Award, Mathematics Association of America (1989 and 1994), Guggenheim Fellow (1998—1999), Mahler Lecturer, Australian Mathematical Society (2005), Michio Suzuki Distinguished Research Professor of Mathematics (2001—2005). He is also one of Fellows of the American Mathematical Society in 2012-13 during inaugural year of the Fellows Program of the AMS.

Prof. Nayandeep Deka Baruah is in the Department of Mathematical Sciences, Tezpur University, Assam. His research interest is in Number Theory, Special Functions, Ramanujan's Mathematics, especially, Elliptic and Theta Functions, Modular Equations, Continued Fractions, *q*-series, and Theory of Partitions. So far, Prof. Baruah has published more than 50 papers. He is a recipient of ISCA Young Scientist (2004), Dr. B. M. Das Memorial Science Award 1999-2003 (2006), BOYSCAST Fellowship of DST (2005-06), under which he spent the year March, 2006 -- March, 2007 at the University of Illinois at Urbana-Champaign, USA, as a Visiting Scholar and conducted joint research work with Professor Bruce C. Berndt.

Dr. Rupam Barman is an Assistant Professor in the Department of Mathematics, Indian Institute of Technology Delhi. His research interests include Iwasawa Theory, p-Adic Measures, Elliptic Curves, Hypergeometric series, and Modular Forms. So far, Dr. Barman has published more than 20 papers. He is a recipient of Post-Doctoral Fellowship of Mathematics Center Heidelberg (MATCH), University of Heidelberg, Germany (2011), ICTP Trieste, Italy (2011).

Travel Information: The university campus is located about 15 km east of Tezpur, the headquarters of Sonitpur District of Assam, INDIA. It is well connected with Guwahati, the capital city of Assam, which is about 200 km from Tezpur. Guwahati is also well connected by air and train with the rest of the country.

Registration: Interested participants will have to first register with the GIAN website (http://www.gian.iitkgp.ac.in) for a one-time registration fees of Rs. 500.00 which will enable them to enrol for any number of courses being offered. Subsequent registration for this course will have to be done with Tezpur University by the **SHORTLISTED CANDIDATES AFTER GETTING CONFIRMATION E-MAILS FROM THE COURSE COORDINATOR.** They need to pay the requisite fees and fill up the Registration form attached with this brochure. Duly filled in registration form can be sent to the coordinator both by online and offline mode.

Course Coordinator

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http://www.gian.iitkgp.ac.in/GREGN

A GIAN Course on

INFLUENCE OF RAMANUJAN IN NUMBER THEORY
July 25 — August 06, 2016

Department of Mathematical Sciences, Tezpur University
Napaam-784028, Sonitpur, Assam, INDIA

REGISTRATION CUM ACCOMODATION REQUEST FORM

(To be submitted by the SHORTLISTED CANDIDATES ONLY AFTER GETTING CONFIRMATION E-MAILS FROM THE COURSE COORDINATOR. This form should reach electronically by June 25, 2016 and hard copy by July 5, 2016)

Name (Block Letters): …… M/F: ……

Designation/ Professional Title: ……..

Organization: ……

Address: ……

……...

……

Tel.: …….. . Mobile: ……....

E- mail: …….

Accommodation Required (Yes/ No): ……..……...

Single Accommodation (Yes/ NO) : …..……..

Double Accommodation (Yes/ NO):…….

The Registration fee of Rupees ……has been paid via Demand Draft No……..in favour of The Registrar, Tezpur University/Through SBI online/offline banking bearing Transaction No. ……..... to SBI Tezpur Main Branch (RTGS/IFSC code: SBIN0000195, Bank MICR Code: 784002002) A/C No. 30448821505 of Tezpur University. Demand Draft/ Fee Receipt have been enclosed herewith.

Date: Signature