

### Academic Job Profile:

Jan. 2021 – **Ph.D. Mathematics**, [University of South Carolina \(USC\)](#), Columbia, South Carolina.  
Dec. 2025 **Advisor:** Dr. Matthew Boylan  
**GPA:** 4.0 / 4.0  
**Passed Qualifying exams** (Analysis - August 2021, Algebra - January 2022)  
**Passed Comprehensive Exams** (February 2023)

### Research Interests

Analytic Number Theory, Modular forms,  $L$ -functions, Partition Theory, Elliptic Curves.

### Papers and Preprints

[[arXiv:2401.03663](#)] Boylan M., Swati, *Congruence properties modulo prime powers for a class of partition functions*.  
Boylan M., Swati, *Shimura Correspondence on forms with eta-multiplier* (in preparation).

### Semester programs and Projects

Jan. 2021 – **Arizona Winter Semester(AWS)**, *School in Number Theory*, 2021, Virtual.  
Apr. 2021 **Session 1:** Modular Groups and Modular Forms  
**Session 2:**  $p$ -adic numbers and quadratic forms  
AWS 2021 was held in two, 6-week, online sessions. All the selected participants were required to attend two lecture series for each session, comprising of 6 lectures each (one per week), as well as accompanying problem sessions and moderated discussions.

Sep. 2020 – **Budapest Semesters in Mathematics (BSM)**, *Advanced Math Program*, non-credit,  
Dec. 2020 Online.  
**Courses:**

- Real Functions and Measures (Measure Theory, Topology and Hilbert Spaces)  
Prof. Maga (Course Grade - **A**)
- Complex Functions - Prof. Szilard (Course Grade - **A+**)

It's a semester-long, highly acclaimed study abroad program program that allows qualified math students to take advanced courses taught by BSM Professors in Hungary. Due to COVID-19, it turned online for the Fall as well as Spring semester.

May 2020 – **Project JRF**, [Department of Mathematics, Indian Institute of Science Education and Research \(IISER\)](#), *Bhopal, India*, Supervisor: Dr. Karam Deo Shankhadhar, Assistant Professor (Cancelled due to COVID).

Nov. 2018 – **Visiting Researcher**, [Department of Mathematics, The Institute of Mathematical Sciences \(IMSc\)](#), *Chennai, India*, Supervisor: Dr. Srinivas Kotyada, Professor H.  
Mar. 2019

The project aimed at studying the growth rate of the Riemann zeta function and the gaps between the successive zeros on the critical line. Subsequently, we studied the growth of classical zeta functions, namely Epstein zeta function and Selberg class of  $L$ -functions, in the critical strip. More generally, we derived the Riemann-von Mangoldt formula for the Selberg class.

Feb 2018 – **Research Assistant-I**, *Department of Mathematics, The University of Hong Kong (HKU), Pokfulam, Hong Kong*, Supervisor: Dr. Ben Kane, Associate Professor.

The work primarily centered on determining the connections between regularized Mellin transforms of unary theta functions and a family of  $L$ -functions. I derived the relevant functional equation for these  $L$ -functions associated to shifted lattices.

Feb. 2017 – **Project Assistant, Development of Modules and Tools for Integer Factorization using Number Field Sieve (NFS)**, *Department of Mathematics, Harish-Chandra Research Institute (HRI), Prayagraj (Allahabad), India*, Funded by Defence Research and Development Organisation (DRDO), Supervisors: Dr. Kalyan Chakraborty (Professor H), Dr. R. Thangadurai (Professor H).

The problem involved factorization of a 596-bit RSA modulus using NFS. For reducing the time complexity involved in the factorization, I developed an algorithm to increase the efficiency of the Sieving module of NFS.

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## Academic Details

2014 – 2016 **M.Sc. (Mathematics and Computing)**, *Thapar Institute of Engineering and Technology (TIET), Formerly Thapar University*, Punjab, India.  
**CGPA - 8.78 (on a 10.0 point scale) , Rank - 3<sup>rd</sup>/20**  
**U.S. Equivalent: 3.647 (on a 4.0 point scale)**

2010 – 2013 **B.Sc. (Mathematics, Statistics and Computer Science)**, *Punjabi University*, Punjab, India.  
**Percentage - 83.5**

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## Master's Thesis

Jan - Aug 2016 **Class preserving automorphisms of finite  $p$  - groups**, Supervision of Dr. Deepak Kumar Gumber, Professor, School of Mathematics, TIET, Punjab (India).

The central focus of the thesis involves an in-depth study of the problem of finding a neat upper bound for the order of group of class preserving automorphisms of finite  $p$ -groups.

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## Talks/Seminars

Nov. 16<sup>th</sup>, 2023 **Talk: “Shimura Correspondence on forms with eta-multiplier”**, GRADUATE COLLOQUIUM, Department of Mathematics, USC.

Apr. 19<sup>th</sup>, 2023 **Talk: “Theory of half-integer weight modular forms and Shimura Lifts”**, GRADUATE COLLOQUIUM, Department of Mathematics, USC.

Feb. 15<sup>th</sup>, 2023 **Talk: “Some topics on the structure and application of modular forms”**, ORAL COMPREHENSIVE EXAMS, Department of Mathematics, USC.

Nov. 29<sup>th</sup>, 2022 **Talk: “Homology of Noetherian and local rings (John Tate, 1957)”**, DEPARTMENT OF MATHEMATICS, USC.

Mar. 21<sup>st</sup>, 2018 **Talk: “Sieving Techniques in Number Field Sieve”**, POSTGRADUATE NUMBER THEORY SEMINAR, University of Hong Kong (HKU).

Jul. 5 - 8<sup>th</sup>, 2017 **Two lectures: “Lattice Sieving in Number Field Sieve (Rational and Algebraic Sieving)”**, DRDO WORKSHOP, HRI.

Aug. 5<sup>th</sup>, 2017 **Thesis Defense “Class preserving automorphisms of finite  $p$  - groups”**, DEPARTMENT OF MATHEMATICS, TIET.

Fall Sem. '15 **Two seminars: “Burnside Lemma and its Applications” and “Orthogonal Transformations in 2-D”**, DEPARTMENT OF MATHEMATICS, TIET.

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## University Teaching Experience

- MATH 122 Instructor of Record (Spring 2024) - Calculus for BA and Soc Sciences  
MATH 242 Instructor of Record (Summer 2023) - Elementary Differential Equations  
(Course Evaluations)  
MATH 115 Instructor of Record (Spring 2023) - Precalculus Mathematics  
MATH 170 Instructor of Record (Fall 2022/Fall 2023) - Finite Mathematics  
MATH 111 Instructor of Record (Fall 2021/Spring 2022) - College Algebra  
MATH 142 Instructor of Record (Summer 2021/Summer 2022) - Calculus II  
(Course Evaluations)  
MATH 141 Teaching Assistant (Spring 2021) - Calculus I

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## Summer Schools/Conferences/Workshops

- Oct. 16, 2023 – [Group Theory and Number Theory: Interactions](#), A CONFERENCE IN HONOR OF TIEP'S  
Oct. 20, 2023 60TH BIRTHDAY, PRINCETON UNIVERSITY, Princeton, NJ  
Oct. 21, 2023 – [Palmetto Number Theory Series \(PANTS XXXVI\)](#), CLEMSON UNIVERSITY, Clemson,  
Oct 22, 2023 SC.  
Jul. 02, 2023 – [Inclusive Paths in Explicit Number Theory](#), BANFF INTERNATIONAL RESEARCH STA-  
Jul. 15, 2023 TION(BIRS), UNIVERSITY OF BRITISH COLUMBIA (UBC) OKANAGAN, KELOWNA,  
BC, Canada (Attended virtually due to late arrival of Visa)  
The first week of IPENT consists of mini-courses on several topics in explicit number  
theory and the second week comprised of group research projects in the area.  
June 12, 2023 – [Rethinking Number Theory](#), AIM RESEARCH COMMUNITY, VIRTUAL  
June 23, 2023  
**Project: Dynamic Irreducibility**  
**Project Leaders: Dr. Jamie Juul and Dr. Bella Tobin**  
It is a research workshop wherein selected students work in groups along with project  
leaders. My assigned project involved investigating dynamical irreducibility over finite  
fields for families of polynomials of degree larger than 2.  
Mar. 11, 2023 – Southern Regional Number Theory Conference, LOUISIANA STATE UNIVERSITY(LSU),  
Mar. 12, 2023 Baton Rouge, LA.  
Dec. 10, 2022 – [Palmetto Number Theory Series \(PANTS XXXV\)](#), UNIVERSITY OF SOUTH CAROLINA  
Dec. 11, 2022 (USC), Columbia, SC.  
15 Nov, 2022 Bayou Arithmetic Research Days, BARD 1, LOUISIANA STATE UNIVERSITY (LSU)  
(Virtual)  
Sep. 24, 2022 – [Palmetto Number Theory Series \(PANTS XXXIV\)](#), UNIVERSITY OF NORTH CAROLINA  
Sep. 25, 2022 (UNC), Charlotte, NC.  
June 27, 2022 – Discussion Meeting on L-functions, Circle Method and Applications, INTERNATIONAL  
July 01, 2022 CENTRE FOR THEORETICAL SCIENCES (ICTS), Bengaluru, India. (Virtual)  
June 06 – [Connecticut School in Number Theory \(CTNT 2022\)](#), UNIVERSITY OF CONNECTICUT  
June 12, 2022 (UCONN), Storrs, Connecticut.  
**(Mini Courses: Algebraic Number Theory, Galois Representations, Local Fields,  
100 Years of Chebotarev Density and Computations in Number Theory).**  
May 16, 2022 – [NSF/CBMS Research Conference : Ramanujan's ranks, Mock Theta Functions, and](#)  
May 20, 2022 [Beyond](#), THE UNIVERSITY OF TEXAS RIO GRANDE VALLEY (UTRGV), Edinburg,  
TX.  
Apr. 01, 2022 – First International Workshop in Analytic Number Theory, UNIST (Virtual)  
Apr. 02, 2022

- Mar. 05, 2022 – [Arizona Winter School \(AWS\) - Automorphic Forms Beyond  \$GL\_2\$](#) , UNIVERSITY OF  
 Mar. 09, 2022 ARIZONA, Tucson AZ.  
**(During AWS, I was also a part of the Aaron Pollack's study group on "Modular Forms on Exceptional Groups".)**
- Mar. 02, 2020 – National Workshop on "Analytic Number Theory," KERALA SCHOOL OF MATHEMATICS  
 Mar. 07, 2020 (KSOM), Kozhikode, Kerala.
- May 13, 2019 – Advanced Instructional School (AIS) - Modular Forms, INDIAN INSTITUTE OF TECH-  
 June 1, 2019 NOLOGY (IIT), Guwahati, Assam.
- Dec. 17, 2018 – Intercity Number Theory Seminar, INDIAN INSTITUTE OF SCIENCE EDUCATION AND  
 Dec. 18, 2018 RESEARCH (IISER), Tirupati, AP.
- Jul. 16, 2018 – HKU Number Theory Days, Institute of Mathematical Research, THE UNIVERSITY OF  
 Jul. 23, 2018 HONG KONG (HKU), Pokfulam, Hong Kong.
- Dec. 07, 2017 – India - Russia 70<sup>th</sup> Anniversary Celebration Workshop on "Groups and Related Structures,"  
 Dec. 08, 2017 Department of Mathematical Sciences, IISER, Mohali, Punjab.
- Sep. 11, 2017 – Workshop on "Operator Algebra" by National Centre of Mathematics - ATM, IMSc,  
 Sep. 16, 2017 Taramani, Chennai.
- Sep. 04, 2017 – International Conference on "Class Groups of Number Fields and Related Topics," HRI,  
 Sep. 07, 2017 Prayagraj (Allahabad), India.
- May 16, 2016 – PG Training Program, "NPDE - TCA", IIT, Ropar, Punjab, India.  
 Jun 04, 2016
- Mar. 28, 2016 – National Workshop on "Group Theory", ST. STEPHENS COLLEGE, DELHI UNIVERSITY,  
 Mar. 29, 2016 Delhi, India.
- Oct. 16, 2014 – 3rd International Conference on "Special Functions and Applications", TIET, Punjab,  
 Oct. 18, 2014 India

## Professional Services

- Fall 2023 - President of the [Association for Women in Mathematics \(AWM\)](#) Chapter at USC.  
 Spring 2024
- April 21, 2023 Reviewer for undergraduate (UG) poster presentations at Discover USC, Columbia  
 Metropolitan Convention Center, Columbia, SC.
- Fall 2022 Panelist, Graduate Teaching Assistant Orientation, University of South Carolina.

## Scholastic Achievements

- 2021 Recipient of **Arizona Winter School Stipend**
- 2018 - 2019 Selected for **Stipendium Hungaricum** Scholarship (from India) to pursue Master's in  
 Mathematics at Eotvos Lorand University (ELTE), Budapest by Tempus Public Foundation,  
 Hungary - Not Availed
- March 2016 Qualified **GATE (Graduate Aptitude Test in Engineering)**, ALL INDIA RANK AIR  
 - 474, Mathematics - 92.48 Percentile score
- 2015 - 2016 Recipient of **Late Dr. H.S. Kasana Scholarship**
- 2014 - 2015 Recipient of **Thapar University Merit Scholarship**
- June 2014 Qualified **ACET** - Actuarial Entrance Examination

## Relevant Coursework

- Algebra - I (Group and Ring Theory), Algebra - II (Field Theory, Galois Theory, Modules, Algebraic Coding Theory), Commutative algebra, Representation Theory, Introduction to Modular forms, Analytic Number Theory, Elliptic curves and Arithmetic Geometry, Computational Number Theory, Linear Algebraic Method in Combinatorics, Linear Algebra, Real Analysis - I (Metric Spaces, Riemann-Stieltje's Integral, Function of Several Variables), Real Analysis - II (Measure Theory and Integration,  $L^p$ -Spaces),

Discrete Mathematical Structure, Complex Analysis, Functional Analysis, Topology, Elementary Number Theory, Fourier Analysis.

- Differential Equations (ODE, PDE), Numerical Analysis, Operations Research, Mathematical Methods, Mechanics.

- Probability and Statistics, Sample Surveys, Statistical Inference - I (Point and Interval Estimation, Testing of Hypothesis), Statistical Inference - II (Sampling distributions, Large sample tests), Design and Analysis of Experiments.

- Fundamentals of Computer Science and C Programming, Data Structures and Algorithms, Database Management Systems, Computer Organisation and Operating Systems, Computer Networks, Visual Programming, Object Oriented Programming, Oracle, Formalization of Mathematics (Lean Prover).

- Mathematics Pedagogy - I, Mathematics Pedagogy - II

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## Teaching Conference

Oct. 4, 2023    Oktoberbest, A Symposium on Teaching, University of South Carolina.

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## Teaching Experience

Spring 2021 -    Tutor, Math Tutoring Center, University of South Carolina  
Current

Jul. 1, 2019 –    Private classes in Mathematics and Statistics for undergraduate level students in science,  
Present    arts and engineering streams (B.Sc., B.Tech, BCA)

Jul. 1, 2013 –    Worked as a part-time faculty in a coaching institute namely, "New Delhi Academy for  
Dec. 31, 2013    Competitive exams". Responsibilities include teaching Mathematics to students of grades  
11-12 and for entrance exams such as CA CPT, LEET etc.

Nov. 1, 2013 –    Worked as a online tutor in Mathematics with "Futor". Responsibilities include teaching  
Apr. 30, 2014    both Indian as well as International students for 9 - 12 grades.

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## Technical Skills

- Programming Languages: C/C++ (Intermediate)
- Completed the online course "Programming for Everybody (Getting Started with Python)" offered by University of Michigan on online learning platform ([Coursera Verified Certificate](#))
- Markup Language:  $\text{\LaTeX}$

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## References

Available on request