

# Joel Sleeba

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## Education

### PhD in Mathematics

University of Houston

August 2024 – Present

Houston, TX

- Relevant coursework: measure Theory, functional analysis

### Master of Science in Mathematics

Indian Institute of Science Education and Research — GPA: 8.38/10

October 2021 – May 2023

Thiruvananthapuram, Kerala

- Relevant coursework: linear algebra, functional analysis, topology, measure theory, probability theory, machine learning

### Bachelor of Science in Mathematics

Madras Christian College — GPA: 8.04/10.0

June 2018 – May 2021

Chennai, Tamil Nadu

- Relevant coursework: linear algebra, real analysis, complex analysis, abstract algebra

## Research Experience

### Peaking Qubit Channels

Research Project

October 2023 – April 2024

Dr. P Shankar, Cochin University of Science and Technology (CUSAT)

- Exploring the possibility to introduce the notion of classical peak points to unital qubit channels.
- Tried to employ the characterisation of unital qubit channels from *On unital qubit channels*, Li and Choi
- Learned about completely positive maps, Choi's theorem, and Steinspring dilation theorem.
- References: *Completely Bounded Maps and Operator Algebras*, Vern Paulsen and *Completely Positive Maps on Complex Matrices*, Man-Duen Choi

### Introduction to C\* Algebras

Summer Reading Project

June 2023 – Sept. 2023

Dr. P Shankar, CUSAT

- Learned the basics of Banach and C\* algebras, Gelfand transforms, functional calculus, sesquilinear forms, GNS constructions.
- References: *C\* Algebras and Operator Theory* by Gerard Murphy and *An Invitation to C\* Algebras* by William Arveson.

### A Study in Fourier Analysis

Masters Thesis

January 2023 – May 2023

Dr. P Devaraj, IISER Thiruvananthapuram

- Learned about Fourier transforms in the circle and line,  $\ell^p$  convergence of Fourier series, Fourier Inversion, and classical Paley Wiener theorems
- References: *Early Fourier Analysis* by Hugh L Montgomery and *Real and Complex Analysis* by Walter Rudin.
- [Read my report on GitHub](#)

## Workshops

### Mathematics Training and Talent Search (MTTS) | Level 1 Summer Camp

April 2021 – May 2021

- Participated in the online summer camp hosted by MTTS trust, funded by the National Board of Higher Mathematics.
- Helped revise concepts in group theory, real analysis and linear algebra.

### Mathematics Training and Talent Search (MTTS) | Level 0 Summer Camp

May 2020 – June 2020

- Gained a deeper understanding of topics including logic, sequence and series, vector spaces.
- The programme promoted active discussions in mathematics and gave a platform to connect with people passionate about mathematics.

## Reading Groups

### Community for Linear Algebra Pursuits

Reading Group

November 2023 – December 2023

Dr. Neeldhara Misra, IIT Gandhinagar

- Reading group for the book *Thirty-three Miniatures: Mathematical and Algorithmic Applications of Linear Algebra*
- [Access the community website here](#)

### Operator Algebra Reading Group

October 2023 – February 2024

- Reading group of graduate students interested in operator algebras and related topics.
- [Access the website here](#)

## Computability

Student Reading Project

January 2022 – March 2022

Ashish Kujur, IISER Thiruvananthapuram

- Learned about computable functions in unlimited register machines(URM).
- Reference: *Computability: An Introduction to Recursive Function Theory*, Nigel Cutland.
- An article we authored as part of the project was published in the quarterly newsletter of Club of Mathematics. [Access it here](#)

## Students' Recreational MTTs

Student Reading Group

June 2020 – August 2020

MTTs 2020 Summer Camp Alumni

- Reading group aimed to self learn and discuss topics from *Linear Algebra* by Friedberg, Insel, Spence.
- [Access the website here](#)

## Additional Courses

### CS101.2x: Object-Oriented Programming

Grade: A+

July 2020 – Dec. 2020

MOOCs Course, IITBombayX

### CS101.1x: Programming Basics

Grade: A+

July 2020 – Dec. 2020

MOOCs Course, IITBombayX

## Extracurricular

### T<sub>E</sub>X- Click

Firefox Addon

Dec. 2023

- Currently developing a Firefox addon to easily extract T<sub>E</sub>X from the equations on websites including arXiv, Wikipedia, and StackExchange. [Access the addon](#)

### Introduction to C\* algebras

Student Seminar Presentation

October 9, 2023

IISER Thiruvananthapuram

- [Access the presentation slides](#)

### Math Modelling

Volunteer

Sept. 2022 – Nov. 2022

*The International Genetically Engineered Machine competition (iGEM), IISER Thiruvananthapuram*

- Modelled the partial differential equations for the internalization of vesicles through cell membrane. [\[Link\]](#)

### Web Development

Volunteer

Sept. 2022 – Nov. 2022

*The International Genetically Engineered Machine competition (iGEM), IISER Thiruvananthapuram*

- [Access the webpage](#)

### Peer Discussion: Real Analysis

Host

March 31, 2022

*Club of Mathematics, IISER Thiruvananthapuram*

- Co-hosted the peer discussion session for first year integrated BS-MS students.

### Online Foundation Course in Mathematics

Mentor

September 2021 – October 2021

MTTs Trust

- Guided first and second year undergraduate students in the post lecture discussion sessions of the course.
- The course aimed at helping students develop mathematical thinking by focusing on logic, sequence and limits and linear algebra.

## Achievements

### CSIR National Eligibility test for Junior Research Fellowship

Rank 58 (out of 29118 applicants), Mathematics

June 2024

*National Testing Agency, India*

### Graduate Aptitude Test in Engineering

Rank 127 (out of 13425 applicants), Mathematics

February 2024

*India*

### M.Sc Entrance Examination

Rank 1, Mathematics

2021

*Pondicherry University*

### M.Sc Entrance Examination

Rank 3, Mathematics

2021

*Hyderabad Central University*

## Technical Skills

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**Programming:** Python, C, C++, Java, Bash, SQL

**Markup:**  $\text{\LaTeX}$ , Markdown, HTML, CSS

**CAS:** MATLAB, GNU Octave, Maxima, SageMath