

Omesh D. Dwivedi

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EDUCATION

DREXEL UNIVERSITY

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

June 2027 | Philadelphia, PA

BACHELOR OF SCIENCE IN PHYSICS

BACHELOR OF ARTS IN MATHEMATICS

HONORS PROGRAM

June 2022 | Philadelphia, PA

HKU (EXCHANGE STUDENT)

Sep-Dec 2018 | Hong Kong, HK

GPA: 3.76

MATH GPA: 3.75

TEACHING EXPERIENCE

COLLEGE OF COMPUTING AND INFORMATICS

Teaching Assistant

Sept 2022 – Present | Philadelphia

TA for Introduction to Computer Science (Fall 2022).

DEPARTMENT OF MATHEMATICS

Mathematics Teaching Assistant, MRC Tutor

July 2020 – Present | Philadelphia, (Remote)

One on one tutoring to help Drexel Undergraduate Students enrolled in introductory to advanced mathematics courses.

TA for Linear Algebra II, (Winter 2021,2022), Discrete Mathematics(Fall 2021), Combinatorics (Fall 2021).

PRESENTATIONS

GASEOUS ELECTRONICS CONFERENCE

October 2020 | Virtual

DFTB+ simulation of B_xN_y species formation for boron nitride nanotubes synthesis

[Abstract Link](#)

STAR SCHOLARS POSTER SESSION August 2018 | Philadelphia

Building GEANT4 Simulations of the Drexel Bubble Chamber for Dark Matter Detection

[Abstract Link \(Page 86\)](#)

PUBLICATIONS

- [1] Omesh Dhar Dwivedi and Darij Grinberg. On the rank of hankel matrices over finite fields. *Linear Algebra and its Applications*, 641:156–181, May 2022.
- [2] Y. Barsukov and Omesh Dwivedi *et al.* Boron nitride nanotube precursor formation during high-temperature synthesis: Kinetic and thermodynamic modelling. *Nanotechnology*, 2021.

UNDERGRADUATE COURSEWORK

ABSTRACT ALGEBRA I Grade: A-

Basic Group Theory, Cosets, Group Actions, Isomorphism Theorems, Sylow's Theorems

ELEMENTS OF MODERN ANALYSIS I Grade: B

Basic Topology, Series, Limits, Continuity, Derivatives, Riemann Integral

LINEAR ALGEBRA I, II GRADE: A, A

Elementary Linear Algebra, JCF, QRD, LUD, SVD, Schur Decomposition

ENUMERATIVE COMBINATORICS GRADE: A+

Binomial coefficients, Bijection, Twelve-fold way, Inclusion-Exclusion, Permutations, Partitions and Generating functions.

TOPICS IN MATHEMATICAL PHYSICS GRADE: A-

Series, Differential Equations, Gamma and Delta Functions, Elementary Complex and Fourier Analysis

GRADUATE COURSEWORK

ABSTRACT ALGEBRA GRADE: A

Ring, Fields, Ideals, Modules, Structure Theorem, PIDs, RCF, JCF, SNF, Character, Representation Theory, Artin-Wedderburn (Dummit and Foote)

TOPICS IN GRAPH THEORY GRADE: A

Elementary Extremal Graph Theory, Asymptotic Analysis, Counting Graphs, Turan's and Mantel's Theorems, Prufer Codes, Steiner Systems, Ramsey Theory, Quasi-Random Graphs, First Moment and Generating Function Methods

PRINCIPLES OF ANALYSIS 1 GRADE: A

Metric Spaces, Compactness, Connectedness, Completeness, Limits, Continuity, Series, Derivatives and Integration (Rudin)

TOPOLOGY GRADE: A

General Topological Spaces, Function spaces, Limits of Sequences, Separation axioms, Compactness, Connectedness, Continuity, Homeomorphisms, Product of N-spaces; Applications to the Real Line, Euclidean N-space, Well-known function space, Hausdorff Measures

ADVANCED LINEAR ALGEBRA & MATRIX ANALYSIS

GRADE: A+

QR factorization, Schur's unitary triangularization, Spectral theorems for normal and Hermitian matrices, Singular value and polar decomposition, JCF, Courant Fisher theorem, Interlacing eigenvalues theorem, Schur's product theorem, Gelfand's formula for the spectral radius, Gershgorin discs, Perron-Frobenius theory (Horn and Johnson)

ALGEBRAIC NUMBER THEORY GRADE: A

(INDEPENDENT STUDY)

Integral, Euclidean, Noetherian and Dedekind Domains; Galois Theory and Field Extensions, Algebraic Number Fields, Integral Bases, Ideal Class Groups and Dirichlet's Unit Theorem (Alaca and Williams)

ALGEBRAIC COMBINATORICS (AUDIT)

q-binomial coefficients, Determinant and Partition identities, Symmetric polynomials, Young Tableaux, LR rule, Crystal Operations, Diamond Lemma, Grothendieck and dual Grothendieck polynomials.

LINKS

Google Scholar:// [Omesh Dhar Dwivedi](#)
OrcidID://0000-0003-3633-8874
LinkedIn:// [omeshdd](#)
Github:// [greatodda](#)
YouTube:// [Omesh DD](#)

SKILLS

PROGRAMMING

• Java • Shell • Python • VPython • MATLAB • SageMath
• \LaTeX

COMPUTATIONAL

• DFTB+ • JMOL • GEANT4 • VMD • Avogadro • OpenMP • Slurm

HONORS AND AWARDS

- **Robert J Bickel Endowed Scholarship**, Department of Mathematics, Drexel University, 2021
- **Susan and Donald Larson Award**, Department of Physics, Drexel University, 2021
- William Lowell Putnam Examination (2020), MAA (top 500)
- **Star Scholar (2018)**, Pennoni Honors College
- **Undergraduate Research Leader (2018-19)**, Pennoni Honors College
- Regional Mathematics Olympiad Scholar, HBCSE (2015)

ACTIVITIES

DREXEL UNIVERSITY DEBATE UNION

Vice President and Founder (Former President)
September 2017 – Present | Drexel University
Octofinalist at Hong Kong Debate Open 2018
Pre-quarter Finalist at North East Asia Open Championship 2018
10th Best ESL Speaker at Huber Debates 2020

MATHEMATICS STUDENT ORGANIZATION

President (Former Vice President and Event Coordinator)
March 2018 – Present | Drexel University
Established and Organized Annual Poker Nights, Annual Graduate School panels, REU search panels, and facilitated the formation of Putnam Study Groups, GRE Math Subject test study groups and a Mentorship program for majors and prospective majors.

DREXEL CHESS CLUB

Vice President (Former Manager)
September 2017 – Present | Drexel University
USCF Regular Rating - 1080
USCF Blitz Rating - 1301
USCF Quick Rating - 1066

RESEARCH

DREXEL UNIVERSITY

Undergraduate Research Project

July 2020 – Present | Philadelphia, PA (Remote)

Worked with **Dr. Darij Grinberg** to find and prove the probability of vanishing Jacobi-Trudi determinants in finite fields for various partition shapes and skew-shapes.

- Found and proved the exact probability of Jacobi-Trudi determinants vanishing for connected ribbons, n-staircases and block staircase partition shapes
- Conjectured a general expression for the probability of the Schur polynomial vanishing for shifted-staircases.
- Generalized the classical result of counting the number of Hankel Matrices with a bounded rank to one where the first few entries of the matrix are fixed.

PRINCETON PLASMA PHYSICS LABORATORY (PPPL)

UNDERGRADUATE RESEARCH ASSISTANT (REMOTE)

April-July 2020, June-October 2021 | Princeton, New Jersey

Worked with **Dr. Igor Kaganovich** to study Anisotropic Etching of Silicon Nitride using Fluorine.

- Setup PBC simulations of Silicon Nitride and Si-100/111 surfaces interacting with F_2 , HF and $(NH_4F)_n$.
- Predicted a two step mechanism for etching of Silicon Surfaces via F_2 chemisorption.

UNDERGRADUATE RESEARCH ASSISTANT (SPRING-SUMMER)

April 2019 – October 2019 | Princeton, New Jersey

Worked with **Dr. Stephane Ethier** and **Dr. Igor Kaganovich** and performed a Computational Study of Boron Nitrogen NanoStructure Formation.

- Setup, ran and studied MD simulations of B_xN_y Systems to understand the most efficient pathway to dissociate N_2 as well as to create recurring BN chain from such interactions.
- Predicted and confirmed a possible pathway of **FullBorene** formation solely from B_2 and N_2 . Results can be viewed at vimeo.com/user103046658
- Performed Kinetic as well as thermodynamic calculations to check the feasibility of the proposed mechanism of FullBorene formation.

DREXEL UNIVERSITY

Undergraduate Research Assistant- STAR Scholars Program

June 2018 – October 2018 | Philadelphia, PA

Worked with **Dr. Russell Neilson** on setting up and running simulations of the Drexel Bubble Chamber.

- Built **GEANT4** using **cmake** from scratch on the department system.
- Designed **GEANT4** Monte-Carlo simulations of the **PICO** (dark matter search experiment) Drexel Bubble Chamber, building, from scratch, its geometry into GEANT4
- Analyzed and processed the simulation and experimental data to calculate the probability of **electronic and nuclear recoils**

NEWS COVERAGE

- Pathway to forerunner of rugged nanotubes that could lead to widespread industrial fabrication, [PHYS.ORG](#)
Article Link