# Gaurav Awasthi
CURRICULUM VITAE

UG Third Year
B.Tech Chemical Engineering (2024)
Indian Institute of Technology Bombay

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## Education

- **Indian Institute of Technology (IIT) Bombay** GPA **9.29/10** *(Oct '20 - Present)*
  Bachelor of Technology in ***Chemical Engineering*** with ***Honors***; Minor in ***Healthcare Informatics***
  Department Rank 4
- **Goa Board of Secondary and Higher Secondary Education** Overall **95.16%** *(2020)*
  Higher Secondary School Certificate
  State Rank 2
- **Central Board of Secondary Education** Overall **97.20%** *(2018)*
  Secondary School Certificate

## Scholastic Achievements

- Currently holding a **department rank** of **4** out of 156 undergraduate students *(Present)*
- Achieved a **perfect 10 SPI** (semester performance index) in the fourth semester *('22)*
- Conferred with **3 AP grades** for academic proficiency thus far, awarded only to **top 2%** students *('22)*
- Awarded the prestigious **KVPY Fellowship** by Department of Science and Technology, GoI *('20)*
- Cleared state-level and qualified for **Indian National Olympiads** for Physics, Chemistry and Astronomy *('20)*
- Secured **State Rank 1** in IIT-JEE Advanced; scored **99.04 percentile** out of **0.15 million+** candidates *('20)*
- Awarded **1$^{st}$** rank out of **200+** students in the state **Science Talent Search Scholarship**, Goa *('20)*

## Publication

- Rajoria, S., . . . , **Awasthi, G.** et al. (in press), "Proteomic investigation for the severity of COVID 19 during the tsunamic hit of second wave in Mumbai"; **Advancements in Experimental Medicine and Biology**, 2022

## Research Experience

**Mechanistic Modelling of Regulatory Networks in Cellular Differentiation** *(May '22 - Present)*
*Guide: Prof. Mohit Jolly | Centre for BioSystems Science and Engineering | IISc, Bengaluru*

- Building a first-principles model capturing the core principles of cell differentiation in **cancer** and **development**
- Utilised a **boolean** architecture to simulate dynamic gene regulatory networks underlying **phenotypic plasticity**
- Increased efficiency by **60%** by developing an alternative computational framework using a matrix-based approach
- Created a systems-level model to simulate upto **100x** larger networks than current small-scale methods

**Evolution of Microstructures in Additively Manufactured 316L Steel** *(Nov '21 - Present)*
*Guide: Prof. Anirban Patra | Department of Metallurgical Engineering and Materials Science | IIT Bombay*

- Developing **phase-field models** to simulate **grain growth** during solidification of pure metals and alloys
- Leveraged MOOSE in order to effectively perform **multi-physics** simulations using **finite-element methods**
- Studied microstructures and **grain boundary evolution** in case of single-seed and polycrystal systems
- Determined optimum cooling mechanisms required to additively manufacture a material with desired properties

**Proteomic Analysis of the Second Wave of COVID-19 in India** *(May '21 - Oct '21)*
*Guide: Prof. Sanjeeva Srivastava | Department of Biosciences and Bioengineering | IIT Bombay*

- Underwent a rigorous orientation programme to acquire familiarity with **mass spectrometry** based proteomics
- Identified **3** peptides from **2** proteins which were **differentially expressed** in non-severe and severe cases
- Leveraged **Skyline** and **MetaboAnalyst** to examine targeted mass spectrometry files of **nasal** swab samples

## Technical Projects

**Flow Patterns in Draining of a Tank** | *Course Project* | *CL254: Process Fluid Mechanics* *(Jan '22 - Apr '22)*
*Guide: Prof. Devang Khakhar | Department of Chemical Engineering | IIT Bombay*

- Verified **Torricelli's theorem** of efflux velocity by executing simulations for varying parameters in a team of **4**
- Analysed differences between laminar and turbulent flow using **icoFoam** and **pisoFoam** solvers in OpenFOAM
- Varied mesh and orifice size using **Gmsh** and used **ParaView** to visualise the resulting flow streamlines

**Cooling of Thermal Hotspots** | *Course Project* | *CL246: Heat Transfer* *(Jan '22 - Apr '22)*
*Guides: Prof. P. Sunthar & Prof. V. Gundabala | Department of Chemical Engineering | IIT Bombay*

- Worked in a team of **8** to develop a cost and energy-efficient technique that dilutes heat fluxes from GPU chips
- Reduced hardware and energy costs by **10 times** on implementing the technique of **thermoacoustic cooling**
- Depicted the achievement of **20 times** greater cooling power than conventional methods using **OpenFOAM**

**CFD Simulation of Flow in a Centrifugal Pump** *(May '22 - Jul '22)*
*Guide: Prof. Devang Khakhar | Department of Chemical Engineering | IIT Bombay*

- Designed a **FreeCAD** model and performed meshing using **Salome** to simulate the flow in **OpenFOAM**
- Utilised the **simpleFoam** solver for steady state, incompressible flow and used **ParaView** to visualise the results

## Technical Skills

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| **Programming Languages** | Python, MATLAB, R, C++ |
| **Software** | MOOSE, Paraview, OpenFOAM, Gmsh, Salome, Skyline, MetaboAnalyst, LaTeX |

## Positions of Responsibility

**Editorial Board Member | Insight - IIT Bombay's Official Student Media Body** *(Apr '22 - Present)*
*Part of an **18**-member team creating content reaching **10k+** students and **650+** faculty; online readership of **400k+***

- Drafted reforms to the minor and preparatory **course systems** impacting **4500+** UG students after analysis of responses to an **institute-wide survey** and extensive interviews with student representatives and professors
- Liaising with student heads for reforms to the **internship policy** pertaining to **900+** dual-degree students
- Authored a nuanced article on a candle march held on campus for the sensitive issue of **Kashmiri Pandit** violence
- Leading **6 freshmen** in an article on online semesters for the Freshers' Newsletter reaching **1300+** students

**Convener | Chemical Engineering Tinkerer's Lab | Institute Technical Council** *(Jun '21 - Apr '22)*
*Part of the **first** team establishing a one-of-a-kind lab focusing on **applied chemical engineering** projects*

- Structured a **2-phase** plan under a budget of **INR 5 million+** to procure equipment and renovate the location
- Formed the **first-ever** special interest group in the department to encourage research among **450+** UG students
- Conceived **ChemExplore**; engaged with **3** professors to conceptualise **11 projects** undertaken by **20+** students

## Mentoring and Teaching Experience

**Department Academic Mentor | Student Mentorship Programme, IIT Bombay** *(May '22 - Present)*
*Part of a **40**-member team selected from 98 applicants based on interviews, inter-personal skills and peer reviews*

- Mentoring **6 sophomores** from the department in their academic and extra-curricular pursuits in the institute
- Contributed to the DAMP blog by authoring **2** exhaustive **course reviews** aimed at guiding the future batches
- Part of the events sub-team, responsible for conducting general and academic help sessions for **150+** students

**Teaching Assistant | Department of Biosciences and Bioengineering, IIT Bombay** *(May '22 - Jun '22)*
*Course: BB101 - Biology | Instructors: Prof. Ambarish Kunwar, Prof. Hari Varma*

- Selected as **one among 19** undergraduate TAs based on overall academic performance and a personal interview
- Responsible for conducting tutorial sessions for **40+** students and clearing doubts through personal interaction

## Relevant Courses Undertaken

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|---|---|
| **Chemical Engineering** | Thermodynamics, Process Fluid Mechanics, Heat Transfer, Mass Transfer*, Chemical Reaction Engineering*, Advanced Transport Phenomena* |
| **Biosciences & Bioengineering** | Modelling Biological Systems and Processes, Epidemiology, Biology |
| **Miscellaneous** | Introduction to Healthcare Informatics*, Electrical and Electronic Circuits*, Numerical Analysis, Computational Methods Lab |
| **Online Certifications** | Engineering Simulations (Cornell University), Python for Data Science (edX), Excel Essentials (Coursera) |

*(*To be completed by Nov '22)*

## Extracurricular Activities

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|---|---|---|
| **Sports** | • Selected among **8** out of **40+** students for the **advanced swimming** summer camp, IITB | *('22)* |
| | • **Youngest** person to complete **1 km** lake swimming at **National Defense Academy**, Pune | *('12)* |
| **Misc.** | • Completed **Green Belt** certification on **Lean Six Sigma** methodology offered by **KPMG** | *('21)* |
| | • Awarded a **special mention** for exemplary work under **Educational Outreach**, NSS-IITB | *('21)* |
| | • Stood **4$^{th}$** at the **state-level** Inter-Higher Secondary School Quiz among **50+** teams | *('19)* |
| | • Appointed as school **Head Boy** owing to academic and extracurricular performance | *('17)* |