

Our Website!



Want to Help?

Math Bootcamp

Rachel Clune, Orion Cohen, Avishek Das, Dipti Jasrasaria, Elliot Rossomme $\pi p \int (R^2 - Z^2)^2 dZ = A = \oint \vec{F} d\vec{I} = 0 \quad nx F = ? (n-1)x \quad |\vec{F}| E = ? \quad p \int (1 - \frac{v_2}{c^2} - 2) f\vec{I} + \vec{J} = 1$ S=2stab $du = -\frac{\alpha \cos \varphi}{\sin^2 \varphi} d\varphi$

Motivation

Based on our experience as students and GSIs, disparate math backgrounds among incoming students

- May amplify existing inequities
- Significantly affect first-year PhD experience surrounding coursework
- Impacts learning in CHEM 220A / 221A

Low self-reported comfort in relevant topics



70% of sampled students took CHEM 220A / 221A

High-dimensional vector spaces

Basis decomposition of vectors

Change in Confidence Levels



Solving differential equations Comfort

Mathematics intervention in a bootcamp format is known to positively impact knowledge and self-efficacy scores in short and long-term.

Pedagogical decisions for math bootcamp

Flipped classroom

- Taught critical concepts for CHEM 220A / 221A
- Content builds on curated mathematical resources
- Emphasized growth mindset and inclusive practices
- Small groups worked directly with instructors
- □ In-person and fully remote course options

Content & structure

Day 1	Day 2	Day 3	Day 4	Day 5
Integration & Differentiation	Coding in Python	Transformations	Fourier Analysis	Numerical Approaches to Diff. Eqs.
Functions & Approximations	Vectors & Vector Spaces	Matrix Algebra	Analytic Approaches to Diff. Eqs.	Probability & Statistics

Qualitative feedback

- CHEM 220a/221a instructors indicate fewer math computation confusions, more group problem solving, remaining challenges translating between physics and math

problems digest specific comfortable math linear algebra_f exposure teaching breakout groups Zoom solve a matrices helpful cohort prepared Python review

Functions Coding Calculus

Linear Algebra **Differential Equations**

Student engagement

- Ten in-person instructional sessions across six subjects
- Students completed daily feedback forms for real-time course adjustments
- Significant time investment across all materials

Bootcamp by the numbers

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Statistics



Future goals & directions

- Institutionalization of Math Bootcamp as part of CoC orientation
- Engaging a broader range of students as Bootcamp instructors to reinforce relationships between cohorts and research groups
- Incorporating more time for new students to build community
- Securing funding to compensate instructors
- 5. Sharing content with students, departments, and other institutions





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recruited assistant instructors



distributed bootcamp packet



bootcamp



bootcamp final

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