PURDUE UNIVERSITY | Department of Mathematics

Undergraduate Research Project

Project Name:	Topology and Social Choice: From Arrow's Theorem to Recent Advances	**Number of Positions:**	1-2
Supervisor:	Sam Nariman		
Supervisor e-mail:	snariman@purdue.edu		
Project Description:	This project explores the intersection of topology and social choice theory. Arrow's impossibility theorem is a cornerstone result showing that no voting system can satisfy certain fairness criteria simultaneously. There are topological proofs using combinatorial geometry that revealed new insights into these theorems. One part of the project introduces students to these topological methods. The project will also study a recent result by Moses Charikar and collaborators on appeasing the majority by shortlisting a committee with the minimum number of members. These approaches blend tools from geometry, topology, probability and combinatorics.		
Final Deliverables:	A carefully written exposition accessible to advanced undergraduates, and a short seminar talk. Optional: A simple simulation or visualization of voting paradoxes.		
Weekly Working Hours	6-8 hours		
For Credits/ Voluntary	Either		
Desired Qualifications	Required: Linear algebra, Topology, discrete math Preferred: Probability		

If you are interested in participating in this research project, please send an e-mail to the supervisor e-mail listed above together with a resume, a list of what courses you've taken or a copy of your transcript, and a personal statement explaining why you are interested in this project.

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