

# INDUSTRIAL & SYSTEMS ENGINEERING SEMINAR

**Wednesday, February 22**

3:15 PM – Refreshments before the seminar

3:30 PM – Graduate Seminar

**Mechanical Engineering Room 4125 A & B**



## **Mathematics and Democracy: Designing Better Voting and Fair-Division Procedures**

**Professor Steven Brams**

New York University

Mathematics can illuminate two essential features of democracy:

- how individual preferences can be aggregated to give a social choice or election outcome that best reflects the interests of the electorate;
- how public and private goods can be divided fairly, respecting due process and the rule of law.

The product of such analysis is normative: To design institutions that meet certain “engineering” specifications and, therefore, may be superior to institutions that, because they arose more haphazardly, may not satisfy these specifications. Like engineering in the natural sciences, which translates theory (e.g., from physics) into practical design (e.g., a bridge), engineering in the social sciences translates rational-choice analysis into the design of better political-economic-social institutions. Whereas questions of aggregation are primarily the focus of *social choice theory*, questions of division are the focus of *fair division*. Game theory contributes to both areas by asking about the stability, or robustness, of institutions. An election reform called “approval voting” will be used to illustrate a social-choice mechanism, and a fair-division procedure called “adjusted winner” will be used to illustrate a fair-division mechanism. Comparisons will be made with alternative mechanisms, based on each mechanism's properties; in the case of approval voting, experience with its use will be discussed.

BIO: Steven J. Brams is Professor of Politics at New York University and the author, co-author, or co-editor of 17 books and more than 250 articles. His books include *Theory of Moves* (Cambridge, 1994) and, co-authored with Alan D. Taylor, *Fair Division: From Cake-Cutting to Dispute Resolution* (Cambridge, 1996) and *The Win-Win Solution: Guaranteeing Fair Shares to Everybody* (Norton, 1999). His newest books are *Mathematics and Democracy: Designing Better Voting and Fair-Division Procedures* (Princeton, 2008) and *Game Theory and the Humanities: Bridging Two Worlds* (MIT, 2011). He holds two patents for fair-division algorithms and is chairman of the advisory board of Fair Outcomes, Inc. Brams has applied game theory and social-choice theory to voting and elections, bargaining and fairness, international relations, and the Bible, theology, and literature. He is a former president of the Peace Science Society (1990-91) and of the Public Choice Society (2004-2006). He is a Fellow of the American Association for the Advancement of Science (1986), a Guggenheim Fellow (1986-87), and was a Visiting Scholar at the Russell Sage Foundation (1998-99).

**FOR MORE INFORMATION ON PROFESSOR BRAMS’ RESEARCH, PLEASE VISIT:  
<http://politics.as.nyu.edu/object/stevenbrams>**