
Methodology and Formal Theory in Political Science at Berkeley

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The Berkeley program in empirical methodology and formal theory offers rigorous training that is carefully integrated with major substantive agendas in political science.

The program builds centrally on innovative faculty research, which encompasses new methods for causal inference and program evaluation, as well as statistical computing and survey analysis. The work on surveys has included path-breaking contributions to developing and refining experiments embedded in surveys and computer-assisted telephone interviewing; and innovations in measuring issue orientations and in multi-level modeling of political behavior. In formal theory, faculty have contributed to opening new lines of inquiry into strategic interactions where formal institutions are weak, and to modeling information and incentives in organizations—as they affect both the dynamics of institutions within the United States and those in authoritarian and democratizing regimes. Faculty in both traditions play a prominent role in developing empirical tests of formal theory, based on both laboratory experiments and observational data. The faculty has also done influential work on qualitative methodology, comparative-historical methods, and linking qualitative methods with both quantitative tools and with formal analysis.

The methods/formal faculty makes important institutional contributions on the Berkeley campus. They convene the Political Economy Seminar, which draws together a national constituency of leading modelers for its biweekly meetings. They have led the campus Survey Research Center and helped to sustain its innovative research on survey methodology; and they were central to launching the Berkeley's NSF/IGERT training program in Politics, Economics, Psychology, and Public Policy (PEPPP). Berkeley's Institute of Governmental Studies, as well as the Survey Research Center, are important venues for convening scholars and graduate students, and they provide support for graduate students pursuing methodological and formal training. Methods faculty have cross appointments in Statistics, Economics, and other departments, and students are encouraged to pursue advanced training across campus as well as in the department.

Faculty members also play leading roles in the national political science profession. Their contributions have included serving as Chair of the Board of the American National Elections Studies (ANES); providing crucial leadership in launching the NSF program on the Empirical Implications of Theoretical Models (EITM); co-editing the new *Oxford Handbook of Political Methodology*; serving as President of the Political Methodology Society; and founding APSA's Organized Section for Qualitative and Multi-Method Research. The political science department maintains close ties with the national Institute for Qualitative/Multi-Method Research, and many graduate students attend the institute. Three of the methods/formal faculty are Fellows of the American Academy of Arts and Sciences.

Graduate Training

The graduate program offers a broad introduction to methodology and formal analysis, as well as providing advanced training that is pursued by many students. A summer math course is offered annually to entering students, and provides a foundation for all other methods courses. Building on this resource, students who seek general introductory training may pursue the “course-out option,” through which they can satisfy the requirement for one of their Ph.D. exams. Beyond that level, many students take a substantial number of additional courses. Some of these students – particularly those who intend to become professional methodologists and/or modelers – take the Ph.D. exam, which presumes a high level of training, and for which they may choose to focus primarily either on empirical methodology, or on formal theory.

The building blocks of the program are as follows:

1. Math Refresher. This summer math course is strongly recommended for all entering students who will take methods courses during their Ph.D. program. The course provides a review of basic math, establishing a shared foundation of math skills that is the point of departure for the methods sequence. The course focuses on basic topics in functions, calculus, optimization, linear algebra, and probability. Tests are given at the start and conclusion of the course that will allow students to evaluate their skills and readiness for the methods sequence.

2. Course sequences. The department offers sequences in quantitative empirical methods, formal theory, research design, and qualitative and multi-method research. The quantitative empirical methods sequence begins with *Quantitative Analysis in Political Research* (231a and 231b); continues with *Statistics of Causal Inference in the Social Sciences* (236a and 236b); and adds numerous topical courses such as *Special Topics in Design-Based Inference* (239). The formal theory sequence begins with *Formal Models of Political Science* (232a and 232b) and continues with advanced topical courses under the 239 course number. Finally, the department offers courses in research design (235), qualitative and multi-method research (239-1), and other topics.

3. Course-Out Option. Effective for the cohort entering in fall 2015, students wishing to pursue the “course-out” option in methods should take the two semesters of *Quantitative Analysis in Political Research* (231a and 231b) and *Formal Models in Political Research* (232a), as well as one advanced class corresponding to their chosen track (for example, quantitative empirical methods, formal theory, or multi-method research). Advanced courses that can be used to satisfy the requirement include:

- Statistics of Causal Inference in the Social Sciences—236a;
- Formal Theory—232b, or appropriate 239 course;
- Special Topics in Design-Based Inference—239;
- Research Design—235; or
- Qualitative Analysis and Multi-Method Strategies—239-1.

Upon approval of the methods field coordinator and Head Graduate Advisor, students may be allowed to replace these courses with other advanced offerings in the department or with courses in statistics, computer science, economics, or other fields. Students who entered the program before fall 2015 must take 231a, 232a, and one other course from among 231b, 236a, 232b or appropriate 239 course on formal theory, 235, 239 (e.g., Special Topics in Design-Based Inference), or 239-1 (Qualitative Analysis and Multi-Method Strategies). Questions about whether a particular course satisfies the requirements for the course-out option should be addressed to the methods field coordinator or Head Graduate Advisor.

4. Further Training. Many students pursue extensive further training, through which they deepen their command of methodology and formal analysis, prepare for the Ph.D. exam, learn to apply advanced analytic tools in their own research, and in some cases become professional methodologists or formal theorists. Some of these students publish articles on empirical methods—both quantitative and qualitative—while in graduate school, as well as articles based on formal analysis.

4a. Empirical Methods. The following courses are sometimes offered for students who seek more advanced training: *Psychometrics and Econometrics* (233), *Political Behavior Models, Game Theory, and Statistical Methods* (260), and *Advanced Topics in Quantitative Methodology* (239-2). Students routinely extend their methodological skills by taking courses in the Departments of Statistics, Computer Science, Economics, and other departments. Over past few years, quite a few have pursued an M.A. degree in one or the other of those departments.

4b. Formal Theory. The training in formal modeling, building on the introductory treatment of game theory (232a), links modeling with substantive applications that span all areas of political science. All of the courses are appropriate for students wishing to incorporate modeling into their own research, regardless of their subfield. *Formal Models in Political Science-Part II* (232b) extends the coverage of 232a to other families of models; recent treatments have focused on bargaining problems and inefficiencies in politics, with particular reference to interstate conflict. This course covers different substantive areas each year, and may be repeated for credit. Thus, *Formal Models in American Politics* (232a) treats specific models in greater depth – for example, models of bargaining and information asymmetries – and illustrates their application in the study of American political institutions. A similar course is planned in comparative politics. Applications of formal models to the field of political behavior, as well as the rigorous empirical testing of formal models are addressed in the course noted above on *Political Behavior Models, Game Theory, and Statistical Methods* (260). Several advanced topical modeling courses are offered under the 239 course number.

A number of students further develop their skills by taking additional advanced courses on game theory, decision theory, information economics/contract theory, and models in political economy, which are offered multiple times each year in the Department of Economics and the Business School. Students developing advanced modeling skills, like those working on empirical methodology, have pursued an M.A. in Economics.

Faculty Who Teach Graduate Courses on Empirical Methodology and Formal Theory

Henry E. Brady. Econometrics and psychometrics, multi-method strategies, empirical tests of formal models. Current work on voting systems, corporate lobbying, and the role of ethnic cleavages in the collapse of the Soviet Union.

David Collier. Qualitative analysis, multi-method research, concept analysis, comparative-historical method. Democratic and authoritarian regimes, with a particular focus on Latin America.

Thad Dunning. Research design, causal inference, statistical methods, experiments and natural experiments, field research, and the integration of quantitative and qualitative methods. Emphasis on comparative politics and political economy.

Sean Gailmard. Game-theoretic and statistical modeling of political processes, laboratory-based experimental research on individual choice in collective decision-making. Focus on American political institutions.

Peter Lorentzen. Formal models of non-democratic politics and institutions, qualitative testing of formal models. Studies the dynamics of authoritarian regimes, with a central focus on China.

Joel Middleton. Survey sampling and design, field experiments, data analysis, and political decision making.

Robert L. Powell. Game-theoretic analysis of war, political conflict, and the politics of weakly institutionalized settings. Current work includes research on terrorism.

Jasjeet Singh Sekhon. Causal inference in observational and experimental studies, program evaluation, statistical theory and methods, statistical computing. Current research includes exploration of innovative survey methods for the study of voting behavior.

J. Merrill Shanks. Survey data collection and analysis, social science computing, electoral behavior, and public opinion. Current work includes developing new measures of citizen views on policy issues.

Laura Stoker. Research design, survey methods, sampling, quantitative analysis, multi-level modeling, history of statistics. Current work includes a focus on the dynamics of public opinion across generations and over the life-cycle.

Jason Wittenberg. Large-N statistical methods, multi-method strategies, computational modeling, archival research. Current work includes developing new software for ecological inference and analyzing the social bases of political radicalism in interwar Eastern Europe.

Additional Political Science Faculty who Specialize in Formal Theory and its Applications

Rui de Figueiredo. (Joint with Business School) Formal models of political institutions, quantitative empirical tests of formal models. Focus includes study of bureaucratic structures and performance, and of ethnicity.

Gérard Roland. (Joint with Economics) Formal models of comparative politics, political economy of economic transitions. Focus on institutional change in the European Union, Eastern Europe, Russia, and Asia.

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