The Department of Psychological & Brain Sciences teaches graduate students who are interested in becoming the next generation of academic researchers and educators in psychological and brain sciences. Graduate study may be undertaken in the following general areas: Behavior, Brain, & Cognition; Clinical Psychology; Aging & Development; and Social & Personality Psychology. The traditions of Washington University and the department encourage interdisciplinary graduate study, both between the subfields of psychological and brain sciences and across other disciplines. Therefore, whereas students must affiliate with at least one of the areas within psychological and brain sciences, they are frequently affiliated with multiple areas within psychological and brain sciences. Further, many graduate students in Psychological & Brain Sciences also engage in interdisciplinary learning, scholarship and research. For example, cross-disciplinary opportunities and research are available in the Division of Biology and Biomedical Sciences (e.g., neuroscience and genetics); in the programs of Linguistics and of Cognitive, Computational, and Systems Neuroscience; in African-American Studies; and in Philosophy-Neuroscience-Psychology, as well as in several departments in the schools of Medicine and Engineering.

The Department of Psychological & Brain Sciences admits students for full-time study toward the PhD and does not offer a terminal master's degree. However, students are required to complete a master's degree with a thesis as part of the requirements for a PhD. In addition, the PhD includes required courses (including statistics, methods, ethics, and several core content areas), a subject matter exam, at least two semesters of a teaching experience that fulfills the doctoral teaching requirement, and consistently high-quality research productivity that results in publishable findings.

The Department of Psychological & Brain Sciences now offers the Graduate Certificate in Quantitative Data Analysis, open to graduate students of various disciplines. Advanced skills and knowledge in quantitative analysis, methods and interpretation are critical assets for scholars in a wide range of disciplines within the social sciences. Further, many of the important practical, analytical and conceptual skills are shared across disciplines. Many of the graduate programs in the social sciences include basic quantitative analysis skills within the core required curriculum of their department, but many students would benefit from advanced preparation in this domain. The certificate program will provide an organized means for students to achieve an advanced level of knowledge and skill in quantitative social science data analysis, interpretation and visualization that can be applied and shared in a variety of occupational domains.

The Graduate Certificate in Quantitative Data Analysis will require students to master both an introductory level and a more advanced level of quantitative skills and knowledge. Some of the introductory-level courses might overlap with courses that are already required within a student's individual PhD program curriculum, but the advanced level will require students to go beyond the basic expectations of their graduate program in order to achieve greater depth and breadth of knowledge and abilities.

Students interested in the Graduate Certificate in Quantitative Data Analysis should first apply for admission to the Washington University department in which they wish to obtain a graduate degree. After being admitted, students should notify their department adviser and the Graduate Certificate in Quantitative Data Analysis program director (Deanna Barch; dbarch@wustl.edu) of their plans to obtain the certificate. In addition, students should submit an "Application for Admission to Certificate Program" form to the Graduate School office, and send a copy to the Graduate Certificate in Quantitative Data Analysis office.

Phone: 314-935-6520
Website: https://psychweb.wustl.edu/graduate

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(Neurobiology)

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(Anatomy and Neurobiology)

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Marshall S. Snow Professor in Arts & Sciences
PhD, University of Chicago
(Anthropology; International and Area Studies; Education)
Degree Requirements
PhD in Psychological & Brain Sciences

The following is a brief listing of the requirements for the PhD in Psychological & Brain Sciences. A more detailed description of these requirements may be found in our Guide to Graduate Training (available on our website (http://psychweb.wustl.edu/graduate)). Of note, students in the clinical science training program have somewhat different requirements; please refer to the Clinical Program Handbook as well (available on the clinical program website (http://psychweb.wustl.edu/graduate/clinical-psychology)). All students must:

• Complete required graduate-level courses (courses must be completed for a student to be considered ABD). A typical semester course load for the first two years is 12-13 credit hours, unless teaching or research responsibilities suggest a 9-10 credit hour load.
• Obtain teaching experience commensurate with preparation for an academic career. There is a teaching requirement that all students must meet, the details of which are outlined in our Guide to Graduate Training.
• Attend a 1-credit (one hour per week) seminar on research ethics. This typically happens during the fall semester of a student's first or second year in the program.
• Attend at least five (5) professional development workshops over the entire course of the program.
• Complete a qualifying research project during the first two years of graduate study. This is often referred to as the master's thesis.
• Pass a subject matter examination. This examination must be passed before work on the dissertation can begin.
• Complete a dissertation project and defend it in an oral examination. The research requirements for the PhD are described in more detail in our Guide to Graduate Training.

Graduate Certificate in Quantitative Data Analysis

The goal of the certificate is to ensure that students have both a solid basis in probability and statistics as well as inference and quantitative research design, and some depth of experience in a more advanced topic area. As such, students completing the certificate are required to take at least five courses. Consult the required course listings below. Of note, some courses appear in more than one area, but a course can only be used to fill one of the requirements. In consultation with the certificate adviser, students may substitute equivalent courses or more demanding mathematical treatments of the same course material. For programming prerequisites, visit our website (http://psychweb.wustl.edu/Graduate_Certificate_in_Quantitative_Data_Analysis).
**Core Area Courses (at least one from each area)**

**Probability and Statistics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psych 5066</td>
<td>Quantitative Methods I</td>
<td>3</td>
</tr>
<tr>
<td>Psych 5067</td>
<td>Quantitative Methods II</td>
<td>3</td>
</tr>
<tr>
<td>S50 SWSA 5230</td>
<td>Applied Linear Modeling</td>
<td></td>
</tr>
<tr>
<td>L32 Pol Sci 572</td>
<td>Quantitative Methods in Pol Analysis II: Linear Models (Generalized Linear Models)</td>
<td></td>
</tr>
<tr>
<td>Pol Sci 581</td>
<td>Quantitative Political Methodology I</td>
<td>3</td>
</tr>
<tr>
<td>Pol Sci 582</td>
<td>Quantitative Political Methodology II</td>
<td>3</td>
</tr>
<tr>
<td>L48 Anthro 5365</td>
<td>Problems in Applied Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Econ 508</td>
<td>Mathematics for Economics (Probability and Statistics Review)</td>
<td></td>
</tr>
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**Inference and Quantitative Research Design**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Pol Sci 5024</td>
<td>Causal Inference</td>
<td>3</td>
</tr>
<tr>
<td>Psych 5011</td>
<td>Research Designs and Methods</td>
<td>3</td>
</tr>
<tr>
<td>Educ 503</td>
<td>Foundations of Educational Research</td>
<td>3</td>
</tr>
<tr>
<td>Math 420</td>
<td>Experimental Design (with graduate extension)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Focus Area Courses (at least two from one of these three areas)**

**Longitudinal and Time-Series Data Analysis**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>SWDT 6600</td>
<td>Multilevel and Longitudinal Modeling</td>
<td>3</td>
</tr>
<tr>
<td>SWDT 6905</td>
<td>Propensity Score Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Psych 5068</td>
<td>Hierarchical Linear Models</td>
<td>3</td>
</tr>
<tr>
<td>Psych 5165</td>
<td>Applied Longitudinal Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>B54 MEC 661</td>
<td>Analysis of Time Series Data</td>
<td>3</td>
</tr>
<tr>
<td>Pol Sci 584</td>
<td>Multilevel Models in Quantitative Research</td>
<td>3</td>
</tr>
<tr>
<td>MSB 618</td>
<td>Survival Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Multivariate and Machine Learning Analysis**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Psych 5012</td>
<td>Selected Topics in Design and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Psych 516</td>
<td>Applied Multivariate Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CSE 514A</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>CSE 517A</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>Math 470</td>
<td>Graph Theory (with graduate extension)</td>
<td>3</td>
</tr>
<tr>
<td>Math 535</td>
<td>Topics in Combinatorics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Data Mining and Specialized Research Tools**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>SWCD 5082</td>
<td>Foundations of Geographic Information Systems (GIS) for the Applied Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>CSE 514A</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>CSE 517A</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>MSB 550</td>
<td>Introduction to Bioinformatics</td>
<td></td>
</tr>
<tr>
<td>Math 459</td>
<td>Bayesian Statistics (with graduate extension)</td>
<td></td>
</tr>
<tr>
<td>CSE 316A</td>
<td>Social Network Analysis (with graduate extension)</td>
<td></td>
</tr>
<tr>
<td>Econ 5161</td>
<td>Applied Econometrics</td>
<td>3</td>
</tr>
</tbody>
</table>

The fifth course can be from any of the three focus areas or can be a second course from the Probability and Statistics group.