MEMORANDUM

TO: Psychology Department Faculty

FROM: Quantitative Methods Committee
            (Jonathan Cook, Rick Gilmore, Frank Hillary, Sean Laurent, James LeBreton)

DATE: November 1, 2023

RE: Initiatives to expand the number of faculty who teach graduate courses in
            quantitative methods.

Challenge

"Advancing Psychological Methods" is one of the Psychology Department's core pillars, but only three tenure stream faculty regularly teach core courses in quantitative methods, Jonathan Cook (PSY 507 and 508, annually), James LeBreton (PSY 509 and PSY 531 annually; PSY 507, 508, 535 & 597 occasionally), and Frank Hillary (PSY 511 SCAN Foundations, annually). In the past 10 years, neither James nor Jonathan have had the opportunity to offer substantive classes in their respective areas (IO & Social). Instead, 100% of their teaching has involved teaching graduate statistics to students spanning all areas of the department.

The Department co-sponsored short-term summer boot camps on the R programming language in 2017, 2018, and 2019, and a boot camp on open science in summer 2023. But these bootcamps are not part of our formal curriculum, have no long-term financial support, are offered by faculty on their own initiative and without teaching credit, involve faculty outside Psychology, and serve an audience outside of Psychology graduate students. The department has offered programming classes in Python and MATLAB in the past, but these are also not offered on a regular basis. In the past we offered courses in data visualization and structural equation modeling; however, following the departure of MIchael Hallquist in 2020, neither of those courses have been offered.

A recent survey of current graduate students (n=94 respondents) shows that 90% take PSY 507 and/or 508. Removing first year students who do not typically take advanced courses, we find that 62.8% of upper level students take at least one course beyond the requirements (see figure at right). Twenty-six percent report taking PSY stats courses beyond PSY 507 and PSY 508 and 43.5% report taking higher level courses outside the department, specifically in HDFS, Ed Psych, IST, SoDA, and Statistics.
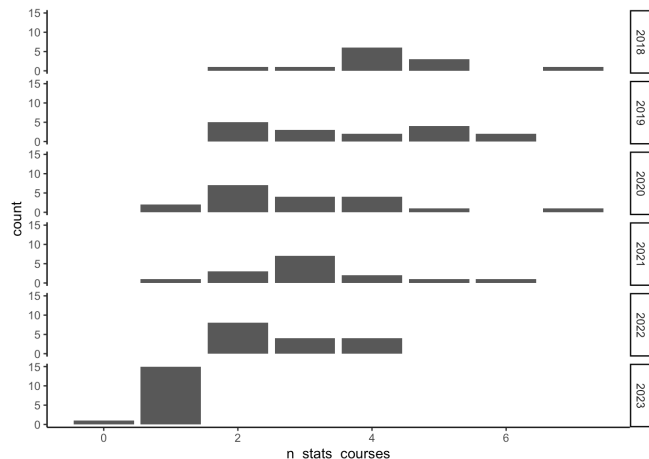
A [survey of graduate students](#) conducted in 2017 suggested that there was substantial student interest[1] in the following topics being offered regularly during the academic year or summer: multilevel modeling, structural equation modeling, multivariate statistics, longitudinal data analysis, data management and visualization, network analysis, psychometrics, foundations of programming, missing data analysis, computational modeling, fMRI data analysis, non-parametric statistics, research reproducibility, dynamic systems modeling, and machine learning. Psychology faculty offer only some of these topics (see table below), and those that are offered are not typically offered on a regular basis. This poses challenges for students who want to create a comprehensive training plan in advance or whose needs for training arise as their research interests evolve.

Course	Last Offered (frequency)	Faculty
Multilevel modeling (PSY 531)	2023 (Annually)	LeBreton
Structural equation modeling		
Multivariate statistics (PSY 509)	2022 (1st time in 10 years; previously offered every year at Purdue)	LeBreton
Longitudinal data analysis		
Data management and visualization	2019?	Hallquist (left PSU in 2020)
Network analysis		
Psychometrics (PSY 509)	2022 (most years)	LeBreton
Foundations of programming (PSY XXX)[2]		
Missing data analysis		
Computational modeling		
fMRI data analysis (PSY 511)[3]	Fall 2023 (Annually)	Hillary
Non-parametric statistics		
Research reproducibility (PSY 525)[4]	Spring 2020	Gilmore

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[1] More than 30 respondents requested that a course be offered.
[2] Python and MATLAB programming classes have been offered from time to time but are not part of the regular teaching rotation for any current member of the faculty.
[3] PSY 511 is part of the SCAN course sequence.
[4] PSY 525 touched on these topics, but a fuller treatment would be preferable going forward.

Dynamic systems modeling		
Machine learning		

In short, student needs for and interest in quantitative methods training exceed our current capacity to support within the department. More broadly, our graduate training program in quantitative methods is vulnerable – if Jonathan, James, or Frank go on sabbatical, have extra releases/buyouts, accept offers from other schools, retire, or get hit by a bus, then our ability to cover core courses in our graduate curriculum will evaporate.

Recommendations

The committee offers this background information and makes the following recommendations in order to start a conversation about solutions.

1. Hire new tenure stream faculty and add quantitative methods expertise as highly desirable characteristics for candidates in ongoing searches.

Benefits: Ability to cover existing courses and develop new courses to meet student needs and an evolving job market. Allow faculty who regularly teach quantitative courses (e.g., 507/508) to teach other courses. Fill needed tenure-stream positions in several areas.

Barriers: Expensive, may take a long time to find and recruit in the current budget climate. We may have difficulties retaining faculty we do recruit.

2. Hire new teaching faculty who will teach core methods classes at the graduate level.

Benefits: Ability to cover existing courses and develop new courses to meet student needs and an evolving job market. Allow faculty who regularly teach quantitative courses (e.g., 507/508) to teach other courses.

Barriers: The priority for hiring teaching faculty is to meet undergraduate teaching needs, especially in critical service courses. So, adding a graduate quantitative methods teaching dimension may affect our success in hiring faculty to meet other needs.

3. Train existing tenure stream or teaching faculty to take on graduate methods classes.

Benefits: Greater ability to cover existing courses, develop new courses, and allow faculty who regularly teach quantitative courses to teach other courses. Broaden the base of tenure stream faculty who teach quantitative courses.

Barriers: This may require summer salary bonuses, an extra paid semester during a sabbatical leave, or weighting methods teaching courses more highly in calculating a faculty member's teaching load. And, addressing these barriers would likely raise equity issues with the faculty who have been responsible for teaching methods courses.

4. Partner with other units where core methods are taught and combine or integrate courses. This might involve inviting faculty in those units to affiliate with Psychology.

Benefits: Quantitative methods courses that could be suitable for psychology graduates are being taught in many units. Indeed, our students take courses in these units already. So, partnerships could benefit those units and the university as a whole.

Barriers: There can be financial implications for the department in expanding long-term affiliate relationships. Partner departments may or may not be interested in sharing faculty with expertise in areas that are highly sought-after or to have larger classes than they are supporting now. Penn State has a long-standing tradition and established culture that expects departments to offer the full spectrum of training opportunities required within a discipline.

5. Explore ways to incorporate and give suitable (course and teaching) credit for workshops, bootcamps, and other learning experiences that are shorter than a full semester.

Benefits: There are a wide array of short-term training experiences available for learning quantitative methods.

Barriers: Existing course length, scheduling, and credit models presume that classes will start and end at time periods governed by the academic calendar. This may make giving partial course credit for short-term experiences challenging. Who will decide which workshops provide suitable content and which do not? Will the graduate school give the department the flexibility needed to make these sorts of decisions?