SPECIAL REPORT

of the

ACADEMIC MATTERS and GRADUATE COUNCILS

concerning the

Creation of an Accelerated Master of Science Program
in Data Analytics and Computational Social Science

(CCMS #6239)

presented at the
799th Regular Meeting of the Faculty Senate
November 12, 2020

COUNCIL MEMBERSHIP

ACADEMIC MATTERS COUNCIL

Wesley Autio, Carol Barr, Carolyn Bassett, Bryan Beck, William Brown, Allison Butler, Marcy Clark, Elizabeth Connor, Morgan Donovan-Hall, Sharon Dormier, Wei Fan, Janet Fink, Jennifer Heuer, , Matthew Komer, Lt. Col. David Lemery, Linda Lowry, Ruthanne Paradise, MJ Peterson, Sarah Pfatticher, Jennifer Randall, Caleb Rounds, Sylvia Salas,Tigran Sedrakyn, Barry Spence, Patrick Sullivan, Jack Wileden, Kate Woodmansee

ACADEMIC MATTERS COUNCIL RECOMMENDATION

The Academic Matters Council recommends approval of this proposal.

GRADUATE COUNCIL

Sonia Alvarez, Pamela Aselton, Evelyn Ashley, Joseph Black, D. Anthony Butterfield, Ana Caicedo, Robert DeConto, Jennifer Friedman, Mark Hamin, Neil Immerman, Cynthia Jacelon, Ramakrishna Janaswamy, Neal Katz, John Lopes, Martina Nieswandt, MJ Peterson, Sarah Pfatteicher, Sarah Poissant, Rebecca Reznik-Zellen, Frederic Schaffer, Patrick Sullivan, Corine Tachtiris, Tilman Wolf

GRADUATE COUNCIL RECOMMENDATION

The Graduate Council recommends approval of this proposal.

Briefly describe the Proposal

Leveraging the widely known reputation of UMass faculty in data analytics, this master's program is geared towards recent college graduates. The accelerated master's provides an opportunity for undergraduates to begin earning credits toward the master's degree. The program trains students in social scientific, computational, informational, statistical and visual analytic approaches to understanding large and complex data that emerges from human behavior and social interactions. Students who graduate from this program will be equipped to design research to support evidence-based decision-making, work with large datasets using a range of analysis methods, and communicate their results to general audiences both visually and in writing.

Provide a brief overview of the process for developing the proposal.

The associated program proposals have been developed by a working group appointed in Fall 2017 by Dean John Hird to develop a new master's degree in data analytics and computational social science. The working group was chaired by Meredith Rolfe (Associate Professor, Political Science) and supported by Ray La Raja (SBS Director of Program Innovation and Professor, Political Science). Almost all members of the original working group are currently serving as official department representatives on the DACSS governance board, as detailed below. The working group drew on lessons learned during earlier attempts by a 2016-17 SBS working group to develop a graduate research methods certificate and a 2014-15 ISSR working group to develop an undergraduate research methods certificate. Delivery of degree courses, particularly the core courses and technical electives, relies heavily on faculty hired across multiple SBS departments as part of the Computational Social Science Initiative.

In conjunction with the one-year MS Data Analytics and Computational Social Science program, we designed a 4+1 MS program that encourages outstanding undergraduate students to transition into the MS program. The accelerated plan proposed for the 4+1 candidates allows those students to develop a stronger skill set in quantitative analysis and analytical thinking. The proposal was reviewed and approved by chairs in SBS, the SBS Dean and Dean of the Graduate School.

<u>*Purpose and Goals*</u>

Describe the proposal's purpose and the particular knowledge and skills to be acquired and provide a rationale for creating this accelerated degree program.

Students who graduate from this program will be equipped to design research to support evidence-based decision-making, work with large datasets using a range of analysis methods, and communicate their results to general audiences—both visually and in writing. Degree students will pursue interdisciplinary coursework and learn to:

1. Identify sources of evidence to use in decision-making
2. Work with large datasets
3. Develop reliable and ethical data management practices
4. Interpret and visualize results of analysis
5. Communicate about data and research to a general audience

The proposed degree program will train students to fill roles that either require cutting edge data analysis and computational social science training or involve regular interaction with trained computer scientists and other data science professionals. Possible career trajectories include analyst and consulting positions in public policy, market research, public relations, corporate communications, population studies, and survey research.

We fully expect that our graduates will be well-prepared for the workplace or further graduate training. While the proposed degree is new, particularly in terms of its interdisciplinary scope, both graduate and undergraduate students across SBS have gone through variants of the training offered by this program with considerable success. For the past 3 years, Political Science has offered a 15-credit letter of specialization in Data Analysis for Politics, Policy and Legal Studies (DAPPLS) requiring students to complete a variant of two of the four core courses (Research Design and Quantitative Analysis) and 3 credits of research experience in addition to one technical and one substantive elective. Only 15-20 students have completed the significantly reduced DAPPLS requirements so far, but those we have tracked have done exceptionally well on both the job market and in applications for further academic study. For example, two women from last year's cohort have recently accepted high profile jobs as researchers at a tech start-up and prominent foundation, respectively, in San Francisco, while a female student from several years ago beat out multiple applicants with advanced degrees for a job as a researcher for an environmental NGO. Several DAPPLS alumni have been accepted and matriculated into high profile doctoral or master's programs at universities such as Harvard, Berkeley, Princeton, University of Chicago, Columbia, and LSE.

Does the accelerated master's option apply to all master's degrees in this field, or only to certain tracks or concentrations?

The accelerated option allows students pursuing the MS in Data Analytics and Computational Social Science to pursue any specialization track that is offered through the electives.

What type of degree program does this accelerated master's option pertain to?
Note: second and third require separate approval.

The accelerated track applies to the Master of Science in Data Analytics and Computational Social Science.

Describe the projected course sequence for this degree and the timeline to completion for students.

The one-year master of science degree requires the satisfactory completion of 10 courses or 30 credits. Coursework will consist of four required core courses, at least three advanced technical core courses, and up to three additional substantive or technical electives. Undergraduates are likely to begin the accelerated program in their third year and complete six to nine credits of graduate work taken while enrolled as an undergraduate. Students are most likely to pursue the path of taking graduate-level work through Political Science 328/750 Research Design for Social Scientists and take up to two technical courses or just a one technical or substantive graduate-level course, or even two substantive courses in the program.

Students in any SBS department who have taken graduate methods courses can apply to the Program Director to have those courses credited as appropriate. Students who have already taken Political Science 328 (undergraduate level work) may complete a research proposal and submit it to the program director to receive graduate credit for the core course research design (Political Science 750.) 4+1 students who enter with graduate credits will still participate in both summer core course experiences, but can take a reduced course load during fall and spring term if desired in order to focus on individual or collaborative research projects or internships.

Degree curriculum has been carefully designed to prepare students for the workforce and reflects current industry standards for data science professionals. According to a report by EAB, a higher education consulting group, employers expect graduates to have sufficient training in programming, statistics and data communication. The four core courses will ensure students are able to meet industry standards in all three areas, while an additional three advanced technical courses will ensure graduates have cutting edge training in one or more social science research methods such as survey research, network analysis or computational text analysis.

Core Courses (Four): The four required courses will provide students with a solid grounding in data collection, programming and data management, statistical data analysis, data visualization and communication, and effective evidence-based decision-making. The four courses are titled: 1) Data Science Fundamentals, 2) Research Design for Social Scientists, 3) Introduction to Quantitative Analysis, and 4) Advanced Data-Driven Storytelling.

   DATA 601 (POLISCI 601) Data Science Fundamentals will introduce students to R—a programming language that will be used in all core courses and many technical electives—and will provide students with a solid grounding in general data management and data wrangling skills. Students will be introduced to career-specific specialized software in electives or workshops. This course will be offered in a condensed, 3-week format during August, alongside Program Orientation.

   DATA 602 (POLISCI 750) Research Design for Social Scientists introduces fundamentals of behavioral research, including hypothesis testing, measurement, and validity, along with an introduction to a range of data collection and analysis methods used in social research (e.g., experiments, surveys, text analysis, econometrics). Students will learn how to design research that can address specific issues encountered in real-world settings, and how to effectively use data analysis to address those questions and support effective decision-making. This course will be offered each Fall Term, and may be offered during Spring Term for 4+1 students at the undergraduate level.

   DATA 603 (POLISCI 755) Introduction to Quantitative Analysis introduces students to quantitative analysis in the social sciences, often referred to as econometrics or statistical analysis. There will be two tracks through this requirement, one of which requires a stronger mathematical background and is a prerequisite for taking some advanced econometrics courses. This course will be offered Fall term. Students may enroll simultaneously in DATA 602 and DATA 603 (POLISCI 750 and POLISCI 755).

DATA 604 (JOURNAL 604) Advanced Data-Driven Storytelling will provide students with hands-on experience writing about and visualizing a range of data types with different communication goals. This course will be offered in a condensed 3 to 6-week format during May and June in the second Summer term after all other degree courses are completed. Students who have previously taken JOURNAL 397DJ may be eligible to omit or substitute some assignments as there may be limited overlap, but this decision will be left up to the course instructor.

Advanced Technical Core (3 or more): Students will be required to take a minimum of three courses (nine credits) of advanced technical training in specialized data analytic methods to ensure that all graduates have cutting edge skills. Students will choose at least three technical courses such as survey research, empirical text analysis, advanced quantitative methods in anthropology, geospatial analysis, modeling emergence and social simulation, experimental economics, panel data econometrics, social and political network analysis, and applied time series econometrics. We expect this list to expand over the next few years due to increased student demand for advanced training, as well as the positive impact of coordination freeing faculty to teach new advanced technical courses. The majority of technical electives that require foundational knowledge introduced in DATA 603/POLISCI 755 will be offered during the Spring term, while less directly related technical electives will be offered during either term.

Substantive Electives (Up to three): Students may take up to three courses that provide substantive background in a range of social science topics. Faculty who have already agreed to accept DACSS students into their regularly offered courses are listed as permanently approved as substantive electives. Other graduate courses in SBS can also be used to fulfill this requirement with the consent of the instructor and approval of the Program Director. Substantive electives can be taken at any time.

Internships will be an optional part of the curriculum, with up to two officially approved internships substituting for either substantive or technical electives, depending on the work involved and the recommendation of the faculty mentor. Internship enrollment will be coordinated by the Program Manager.

What undergraduate degree program is this accelerated masters associated with, if any.

None

If this proposal requires no additional resources, say so and briefly explain why. If this proposal requires additional resources, explain how they will be paid for. For proposals involving instruction, indicate how many new enrollments are expected and whether the courses have room to accommodate them.

The proposed accelerated program requires no additional resources because it is an extension of the Master's program in Data Analytics and Computational Social Science (see accompanying proposal). 4+1 enrolment is already including in the degree enrolment projections with a cap on the overall master's program at 50 students. In the first few years of the 4+1 program, we conservatively anticipate an additional 3-5 students participating each year because it will be an attractive option to undergraduates with interests in this area. By engaging students earlier in

their undergraduate career and providing information on career prospects for data analysts with social science backgrounds, we believe the program will attract 8-10 accelerated MS students.

Provide the curriculum to the applicable masters degree as it currently appears in the Graduate Bulletin and explain how this curriculum will be scheduled over the student's undergraduate and graduate careers. Note that total number of credits must be 30 plus the minimum number required for undergraduate degree (generally 120, making total number of credits required 150).

For Master's programs under 36 credits, a maximum of 9 graduate-level credits taken as an undergraduate may be applied to both degrees. For Master's programs over 36 credits, a maximum of 12 graduate-level credits taken as an undergraduate may be applied to both degrees. See curriculum explained above in question about course sequence. The accelerated program is part of a new MS in Data Analytics Program, which is being proposed simultaneously.

Who can apply to pursue this accelerated master?s degree?
(UMass students, Five College Students, Students in specific degree programs, etc.)

The program targets UMass students, but Five College undergraduates are eligible as well.

Are there any admissions exceptions to this degree program, such as a waiver of the GRE requirements?

Yes.
Comments: Undergraduates who have previously taken a DACSS core or technical course will submit the GRE regardless of their mathematical background. Undergraduates with a recommendation from a DACSS faculty member only need to submit 2 letters of recommendation.

MOTION: That the Faculty Senate approve Creation of an Accelerated Master of Science
09-21   Program In Data Analytics and Computational Social Science, as presented in
           Sen. Doc. No. 21-009.