Three-Year Check-In for New Programs

The creation and maintenance of graduate programs and certificates represents significant resource commitments by faculty and staff. Given these investments, in 2014 the Graduate Faculty Executive Committee (GFEC) established a “check in” process for newly approved programs and certificates prior to their first formal university review (which occurs in the fifth year.) Through this “check-in,” the GFEC hopes program faculty and staff will assess the implementation of their new program and determine what mechanisms may be needed for sustained student success.

Progress reports will be included on GFEC agendas, and program representatives may be asked to attend GFEC if additional information is requested. In the interest of brevity, please keep responses to 300 words or less.

Program Name
MS Statistics: Data Science

Term of First Enrollments
Fall 2015

Check-In Completed By
Sara Rodock and Derek Bean

Date Completed
June 13, 2019

Academic Quality and Student Success

1. Provide an update on any changes to the program’s curriculum and learning outcomes. Include a description of the program’s typical course modalities (face-to-face, online, asynchronous discussion, team or individual assignments) and if courses have evolved based on faculty or student feedback.

The MS Statistics: Data Science (MSDS) program continues to be a face-to-face program with the same learning goals. Courses include a mix of lecture, team and individual projects, and a practicum, with an eye towards preparing students for the skills necessary to be successful data scientists.

We have modified some of the courses and added newly approved, more relevant courses, and provided better clarification about what courses count for what requirements. Here is our current curriculum as of Fall 2019

Core Courses (15 cr)
• STAT 601 Statistical Methods I (4 cr)
• STAT 602 Statistical Methods II (4 cr)
• STAT 610 Introduction to Statistical Inference (4 cr)
• STAT 615 Statistical Learning (3 cr) – this course has replaced STAT 609 Mathematical Statistics I to provide students with a foundation in statistical/machine learning instead of probability

Professional Skills Courses (6 cr)
• STAT 605 Data Science Computer Project (3 cr) – previous offered for 2 credits as STAT 679 Special Topics in Statistics, now has a permanent number and offered for 3 credits to reflect the amount of work in the class
• STAT 627 Professional Skills in Data Science (1-3 cr) – currently offer a Career Development topic under this number
• STAT 628 Data Science Practicum (3 cr)

*Students may substitute STAT 605 or 615 with STAT 609 with advisor approval

Data Science Elective Courses (9 cr)
• Students may count up to 3 credits of Statistics undergraduate electives including: STAT 349, 351, 411, 421, 456, 461, 471, 479, or 575 (3 cr) – previously these specific courses were not defined
• Students may count up to 3 credits of 600-level or above coursework taught outside of Statistics with advisor approval, including courses cross listed with Statistics but taught by other departments (3 cr)
• Students must have at least 3 credits of coursework at the 600-level taught within Statistics including: STAT 641, 642, 679, 701, 709, 710, 732, 741, 760, 761, 771, 775, 803, 809, 811, 834, 840, 841, 860, 877 (3 cr) – previously these specific courses were not defined

Students in MSDS must submit an online course plan through Qualtrics at the start of each semester to confirm what courses they plan to take and receive approval from the student services coordinator.

2. Briefly explain the program’s learning outcomes assessment plan and discuss how you are or how you plan to evaluate student learning. Summarize any data collected to date showing evidence of student learning.
   Since all MSDS students are required to take STAT 628 Data Science Practicum, we have developed a rubric, using the program learning goals, and will be assessing the final
product from the course using the rubric. Spring 2019 was the first year that this was completed. We will evaluate this method for assessment after completing the first year.

3. The GFEC is interested to learn how departments balance faculty and staff teaching loads and responsibilities between new and existing programs. Discuss how the department or program is achieving balance, and what challenges supporting multiple programs may have created for teaching, student services, advising or funding. Also of interest is information on what if any assets are shared between programs, or additional benefits that have been realized.

Faculty and instructional staff teaching loads are balanced on an individual basis by taking into account myriad factors, including the instructors’ expertise, enrollment levels in the instructors’ class, and so forth. Balancing among programs seldom poses a serious challenge relative to these other factors, at least on an individual basis. The challenge is a systematic one, at the Department level; the shifting of certain instructors from one program to another has created vacancies that necessitate the hiring of many short term instructors (and some new permanent instructors) to complete our teaching mission; the process of hiring these personnel can be challenging and time consuming semester-to-semester. However, the revenue generated from our 131 programs has allowed us to hire these personnel, as well as in some cases buttressing the instructional resources available to some courses that serve existing programs--usually in the form of extra TA support coming from 131 funding, and focusing on courses that serve students from several of our programs.

4. Please describe how your program has ongoing and broad faculty commitment, including governance, to ensure its continued success. If applicable, reflections from faculty and staff can be included here or as an appendix. Also consider if implementation of this program is supporting the Department and/or School/College’s current strategic goals.

The implementation of the MSDS program is fully incorporated with the strategic plan of the Statistics Department. As mentioned above, we have been fortunate to use funds from the MSDS program to hire new faculty that add to all dimensions of the mission of the department. Additionally, this year we were able to hire a student services coordinator to oversee the day-to-day management of the program.

**Operations and Administration**

5. Illustrate how the program has either brought in NEW and ADDITIONAL students (required for non-pooled programs), and/or how overall enrollment in your related programs has remained steady. If unanticipated overlap with existing programs has resulted, discuss steps to mitigate the overlap.
Enrollments in Statistics has dramatically increased through the MSDS program. Here are our enrollment numbers for the Statistics MS since Fall 2014 (the year before MSDS began):

<table>
<thead>
<tr>
<th>Program Option</th>
<th>Fall 2014</th>
<th>Fall 2015</th>
<th>Fall 2016</th>
<th>Fall 2017</th>
<th>Fall 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biostatistics</td>
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<td>28</td>
<td>55</td>
<td>68</td>
<td>68</td>
<td>81</td>
</tr>
</tbody>
</table>

We have continued to increase enrollment in MSDS since the creation of the program as we expand instructional faculty and staff. For Fall 2019 we anticipate an enrollment of about 90 students. Part of this increase is because, in Fall 2018, we began admitting “direct MSDS” students. In prior years all students in MSDS had previously been enrolled as Visiting International Scholars Program (VISP). This new admission model is diversifying our student pool, with an additional incoming cohort of 15-20 students who enroll for a total of 3-4 semester (depending on their preferred course pace).

We do have a number of students who apply to both our traditional and MSDS program, and we have improved our marketing material to communicate clearly that the admissions process for MSDS is separate from the Statistics and Biostatistics MS options. We also have been fortunate to recruit a few outstanding MSDS students to our Statistics PhD program.

6. **Funding Considerations**

a. **For traditional/pooled programs** – How is the program successfully funding its students?
   NA for MSDS at this time, but see considerations below.

b. **For non-pooled programs** – Provide a brief summary of projected vs. actual revenues and expenses. Does the program have sufficient enrollment for sustainability? Discuss the current market outlook compared to the original marketing study, and plans to grow or change the program to become sustainable.
   Tuition model was initially identical with pooled programs, but migrated in 2018-19 to $1600 per credit. The program is fully sustainable, based on past and near-term projected enrollments, covering all costs and enabling the department to grow its staff and faculty.

There are now more programs on the market, but we remain competitive, particularly for international students. There is some question whether our domestic pricing at $1600 per credit is too steep; we plan to study the market during the upcoming year to consider revision to diversify enrollment. We would like to modify MSDS to make it accessible financially to URM students.
7. If the program admits international students, describe how program processes address length of stay visa issues, online course restrictions, and needing ESL services.

To date, the majority of students in our program are international students. We communicate with them regularly, via email, our website, and the online program handbook, about all of the requirements, specifically those for international students. Most of this communication is handled now by our student services coordinator.

8. Are there any issues impacting the program’s long-term sustainability? If so, what support would you like to help you succeed?

There are two things that we would like to address as we move forward to help ensure the long-term sustainability and diversity of our program. These include

- How do we provide partial tuition to increase matriculation rates, especially among populations where we would like to see increased enrollment (URM, domestic students, etc.)?
- How can we best publicize our program to attract highly qualified applicants? How do we also increase our matriculation rate (for students paying full tuition)? This must be done in a way that maintains the quality of the student pool, as this program is very challenging technically, and relies heavily on prerequisite training in mathematics.