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SFU OFFICE OF THE PROVOST AND VICE-PRESIDENT ACADEMIC

vpacad@sfu.ca
www.sfu.ca/vpacademic
TEL: 778.782.3925
FAX: 778.782.5876

8888 University Drive
Burnaby, BC
Canada V5A 1S6

MEMORANDUM

ATTENTION	Senate	**DATE**	Oct 31, 2024
FROM	Dilson Rassier, Provost and Vice-President Academic, and Chair, SCUP	**PAGES**	1/17
RE:	External Review Mid-Cycle Report for the Department of Statistics and Actuarial Science (SCUP 24-51)		

At its meeting on October 23, 2024, SCUP reviewed the External Review Mid-Cycle Report for the Department of Statistics and Actuarial Science that resulted from its 2020 External Review.

The following documents are attached for the information of Senate:

- Action Plan Update
- Assessment of Educational Goals
- SCUTL's Feedback on the Assessment of Educational Goals

C: Angela Brooks-Wilson, Dean, Faculty of Science
Derek Bingham, Chair, Department of Statistics and Actuarial Science

SFU OFFICE OF THE PROVOST
AND VICE-PRESIDENT ACADEMIC

8888 University Drive, Burnaby, BC
Strand Hall, Room 3000
Canada V5A 1S6

TEL: 778.782.5731
FAX: 778.782.5876

vpacad@sfu.ca
www.sfu.ca/vpacademic

MEMORANDUM

ATTENTION Dilson Rassier, Chair, SCUP
DATE October 9, 2024
FROM Peter Hall, Vice-Provost and Associate Vice-President, Academic
PAGES
RE: External Review Mid-Cycle Report for the Department of Statistics and Actuarial Science

The External Review of the Department of Statistics and Actuarial Science was undertaken in March 2020. As per the Senate guidelines, the unit is required to submit a mid-cycle report describing its progress in implementing the external review action plan and the assessment of its educational goals. The action plan update has been reviewed by the faculty dean. The Senate Committee on University Teaching and Learning (SCUTL) has provided constructive feedback to the unit on the assessment of its educational goals. The recommendations from SCUTL will be incorporated into the unit's self-study report for the next external review.

The following documents are attached for the information of SCUP:

- Action Plan Update
- Assessment of Educational Goals
- SCUTL's Feedback on the Assessment of Educational Goals

c: Derek Bingham, Chair, Department of Statistics and Actuarial Science
Angela Brooks-Wilson, Dean, Faculty of Science

Department of Statistics and Actuarial Science

Derek Bingham
Chair and Professor
Department of Statistics and Actuarial Science

dbingham@stat.sfu.ca
Telephone: 778 782-3426
Fax: 778 782-4368

July 18, 2024

Dear Dr. Hall,

Please find attached the completed Mid-Cycle Report for the Department of Statistics and Actuarial Science.

Best regards,

Dr. Derek Bingham
Chair and Professor
Department of Statistics and Actuarial Science
Simon Fraser University

External Review Mid-Cycle Report for the Department of Statistics and Actuarial Science June 1, 2024	
Action	**Progress Made**
1. Programming	
Undergraduate	
• **Recommendation 4:** The Department submitted its Faculty Renewal Plans (2020-2020) which corresponds exactly to the Recommendation; if implemented, this will reduce the Department's massive teaching reliance on sessional instruction.	The Dean and University were very supportive. Three teaching faculty members were hired (two in statistics and one in actuarial science). This enabled the Department to reduce the reliance on sessional instruction to roughly 2-4 that are the consequence of various leaves (study, parental, …). The new teaching faculty have proved to be outstanding.
• **Recommendation 5:** The Department began assigning more continuing faculty to teach large service courses and lower division Statistics courses.	The Department, in principle, no longer assigns sessional lecturers to service courses. For instance, in the 2024-2025 academic year, there will be zero sessional instructors used for service courses.
• **Recommendation 6:** The Department considered consider the cutting of STAT 205 and STAT 341, the combining of STAT 450 with STAT 830, will monitor enrolments in STAT 310 and STAT 311, and the blending of ACMA 440 and ACMA 455 into graduate.	We made several changes with the aim of improving efficiency in our course offerings. The following courses are no longer offered: STAT 205, STAT 341, and STAT 320 since the material can be obtained through other courses. STAT 310 and STAT 311 were combined. In Actuarial science, ACMA 440 was discontinued, and ACMA 455 was redesigned to include new content required for accreditation. The new ACMA 455 will be cross-listed with a graduate course.
• **Recommendation 7:** The Department considered adding opportunities for graduate students and postdocs to teach courses.	The Collective Bargaining Agreement for TSSU limits the ability of Departments to guarantee sessional appointments for graduate students and postdocs to 25% of the opportunities (the remaining are open searches with rules stipulated in the Agreement). Interestingly, our focus on assigning

	continuing faculty to large section courses and service courses (Recommendation 5) had the effect of the Department only requiring sessional instruction for upper division courses. Since that time, only our graduate students and postdocs have had the required background to teach these courses.
• **Recommendation 9:** The ActSci group reviewed the admission criteria for the undergraduate program in actuarial science, and specifically the role of ACMA 210 within it; they will also consider the content and design of the ACMA 210-320-425 sequence to encourage enrolment and retention	The admission criteria for the Actuarial Science major were updated. Students can now enter the program directly from high school. The ACMA 210-320-425 sequence was substantially redesigned and relaunched as ACMA 201-301-401 specifically to encourage enrolment and retention while still meeting accreditation requirements. The new ACMA 201 is now only used for evaluating internal transfer applications, not general program admission.
• **Recommendation 16:** When resources permit, we have offered summer courses at the 300-400 levels.	We have attempted to offer courses in the summer that would help students progress in their studies (e.g., STAT 300W) when possible. STAT 300W was cancelled this year due to low enrollment, and we lack the capacity to offer this course next summer. We will keep trying going forward. Several students noted that STAT 350 (typically offered in the fall semester) was a barrier to completion, so we added a spring semester session which has helped progress quite a bit.
• **Recommendation 17:** The TPC will re-visit teaching credit for distance education courses when the teaching landscape stabilizes	We are currently working on standardizing our large-scale service courses (CANVAS pages, lecture notes, etc.) which will (i) lead to improvements in our online offerings; and (ii) make online offering easier, thereby reducing the required workload for instructors.
• **Recommendation 25 and 26:** Data science is increasingly important area, and the Department investigating additional programming options in both Statistics and Actuarial Science, and will coordinate the implementation.	For the Actuarial Science program, the previous programming was replaced with STAT 260 (Introductory R for Data Science), and the Department also launched a new required course (ACMA 231 Tools for Data-Driven Decision Making). In Statistics, STAT 260, STAT 440 (Learning with Big Data), and STAT 452 (Statistical Learning and Prediction), along with CMPT 120 and CMPT 125 (Introduction to Computing Science and Programming I and II) currently meet the data science requirements from the profession. We are considering specialized Data Science streams within both the ACMA and STAT

	programs based on completion of existing courses. As an aside, we have also introduced Data Science courses for the social sciences (STAT 310) and life sciences (STAT 320).
Graduate	
• **Recommendation 12:** The ActSci group investigated changes in the MSc curriculum**.** (From the action plan: "the ActSci group is currently updating the MSc curriculum through the offering of three revised courses; assessment from the courses and input from new faculty will assist in future updates which most likely will include the introduction of a data science option and the offering of joint 400/800 level courses")	The MSc curriculum updates that were in progress at the time of the last review were finalized, with the introduction of three dedicated graduate courses (ACMA 830, 831, and 832). Limited enrollment in these courses, together with the introduction of more advanced content in the professional syllabus, has prompted the department to initiate another round of updates in conjunction with a review of the undergraduate actuarial curriculum. These updates include replacing at least two of the new graduate courses with joint 400/800 level courses.
Other issues	
• **Resource implications:** Recommendation 4 was obviously costly but will be offset some by less need to hire sessional instructors.	We were, initially, not optimistic about the prospect of hiring teaching faculty. We have been quite fortunate that the requests to hire teaching faculty was granted. The result has been (i) a significant reduction in the need for sessional instruction; (ii) more consistency in instruction for our service courses; and (iii) more predictable teaching rotation that is robust to leaves (planned or unplanned).
• **Resource implications:** Many of the recommendations are under way. Those requiring more consideration (6, 11, 17, 25, 26) will be addressed in the 2020/2021 academic year.	Recommendation 6: No new resources are needed. Recommendation 11: No new resources are needed. Recommendation 17: No new resources are needed. Recommendation 25: No new resources are needed. Recommendation 26: No new resources are needed.

2. Research	
• **Comment:** "The Department is especially appreciative of the recognition of the excellence in Research. With the hopeful appointments of continuing Lecturers, we believe that this will enhance our research efforts by allowing researchers to sustain a greater focus on research activities."	The Department remains one of Canada's leading and most productive research groups. It currently is made up of twenty-three research faculty members (twenty-one of whom hold tri-council funding, with an additional member holding industry research funding) and five teaching faculty (two of whom hold teaching related grants and work with graduate students).
• **Recommendations 22 and 23:** The Sports Analytics Group (SAG) at SFU initiated steps towards the formation of an Institute in Sports Analytics; the Department is seen as a key player and supports the initiative	In the end, this endeavour did not have the broad support needed to form such an institute, and sports analytics will remain a research direction for faculty. With that said, SFU continues to be a world leader in sports analytics, and our students move on to impressive jobs (e.g., recent sports jobs taken up by our students include positions at the Detroit Lions (NFL), Pittsburgh Pirates (MLB), Vancouver Canucks (NHL), Seattle Kraken (NHL), Vancouver Whitecaps (MLS), Sports Media Technology (three students), and Zelus Analytics (three students)). The Department is currently developing a course in sports analytics that will be available to SFU students from all faculties with only high school math as the prerequisite.
• **Resource implications and expected completion date**	In spite of the strength of this group, an institute will not be a high priority in the current financial climate. We will reconsider if the situation changes.
• **Other research directions:** The Department continues to explore new strategic directions	This was not explicitly mentioned in the Action Plan, however it is important to mention. At the moment we have requested hires and programmatic development in three main research themes: (i) Data science and computational methods; (ii) Biostatistics; and (iii) Climate risk. Data science continues to be an important and active research area for faculty and resulting in many employment opportunities for students. We have a departmental strength in biostatistics. We have begun exploring both research and programmatic opportunities with BC Cancer (who is co-funding our next hire) and Fraser Health. Climate risk is an important emerging area,

	and we have particular strength in actuarial risk analysis. The actuarial science group is actively pursuing opportunities in this area and our next hire (currently approved by the Dean) will seek a colleague specifically in this area. This will position the group as a leader in an important research area that has significant societal consequences.
3. Administration	
• **Recommendation 9:** Learning Outcomes process was underway	This process was significantly delayed due to Covid 19 and a transition to a new Chair. However, we successfully completed this task for Actuarial Science with support from CEE. This has led to a transformation of the program. In the Data Science program – which in relatively new - a process was initiated with the aim of improving student completion times. To be brief, the program was found to have too many required courses. A proposal was brought to SCUP to address this. Revisions are currently under way, and corresponding learning outcomes are being developed.
• **Recommendation 13:** The Department was asked to initiate a mentoring program.	A program was initiated. Each new faculty member is assigned two mentors (they can chose not to have two). One mentor would advise on research related matters, often sharing granting and advising opportunities, while the second mentor is to advise on administrative matters.
• **Recommendations 14 and 15:** To improve teaching, the Department will add two tasks to the portfolio of the Associate Chair: (1) – the encouragement of faculty to utilize resources such as the CEE and (2) – the development of an annual program that involves classroom visitations and the review of teaching materials.	The Associate Chair now encourages faculty to use CEE resources. Also, we have added classroom visits for new faculty, and participation in CEE and teaching improvement endeavours is now explicitly valued in our TPC deliberations.
• **Recommendation 30:** The Department worked with the Dean's Office to determine appropriate levels of staffing	We have worked with the staff in the Dean's office to make the case for increased administrative capacity. It was recommended that a 0.5-level position be granted. However, financial constraints at the moment make this unlikely in the near future. We continue to hold out hope since this limits our

	ability to create/operate innovative new programs.
4. Administration	
• **Recommendation 1:** The Department worked cooperatively with the university and the Faculty of Science to find solutions to the crisis involving lack of office space for faculty.	The issue was recognized by the Dean. For a short-term fix, the Department was assigned a suite of 5 offices for faculty in the TASC-2 building. While not ideal because these offices are quite far from the Department, we were happy that the faculty had offices. A more permanent solution has been found as part of the Shrum Intervention program. Specifically, a current graduate student office suite will be renovated to include eight new faculty offices. The Statistics Workshop (K9510) will be renovated to accommodate the impacted graduate students, and new space for the Statistics Workshop was allocated to the Department in the West Mall Complex. We are pleased with this solution, but we are concerned that it will limit future growth if needed.
• **Recommendations 2 and 3:** Noting that new graduate student space is soon to be allocated, the Department worked with graduate students to meet their needs involving study space.	New graduate student space was allocated to the Department in the Applied Sciences Building, and all graduate students now have a workspace. This has positively impacted both attendance and also our recruiting endeavors.
• **Recommendations 31 and 32:** The Department worked cooperatively with the Faculty of Science to acquire more suitable common room space and a suitable resource room	The Department has very little common or flexible space. This is unlikely to change. With that said, some positive changes have been made. The Department worked with the Faculty of Science to contribute to the University's application for new Tech seats. As part of the successful application, the Department was allocated a new teaching studio classroom to support the Data Science and Statistics program. The new space is quite flexible for teaching and lab use, as well as other computing related activities.

5. Other	
• **Recommendations 31 and 32:** Professional Masters programs have were investigated in our Department. As recommended by the External Reviewers, a Professional Masters in Actuarial Science was delayed until programming was sorted out and it is clear that there is a market for such a program. A Professional Masters has been considered in Sports Analytics, but it remained to be seen what sort of programming is best suited for this niche area.	We found that a professional Masters program in Sports Analytics would not likely be sustainable in a now crowded market. The same applies to a professional Masters in predictive analytics. Plans are now underway for the development of a professional program in Climate Risk. We are also exploring a professional program in biostatistics that would be in partnership with local health related units. The expected resources are yet to be determined in either case, but there will be a required initial investment. The programs will be designed to be financially sustainable.

Department Chair's Signature

Date

_July 25, 2024_____

Dean's Comments on the Mid-Cycle Report

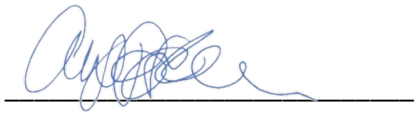
The Department of Statistics and Actuarial Sciences has done excellent work and either completed, resolved or made substantial progress on all relevant goals from their 2020 External Review.

The changes made to courses and instruction will augment both quality and efficiency. I am very pleased to see that the department's foray into incorporating more Lecturers over the past few years is seen as successful, and has essentially eliminated the previous variability seen with shorter term instruction.

Streamlining entry into the Actuarial Sciences undergraduate program is important, as it removes a barrier to enrollment into this small but high-quality and unique program. I look forward to the development of the proposed premium fee program in Climate Risk within Actuarial Sciences.

I thank the Department for their patient and collegial approach to resolving space issues.

Dean's Signature



Angela Brooks-Wilson

Dean, Faculty of Science

Date

August 23, 2024

SFU OFFICE OF THE VICE-PROVOST, LEARNING & TEACHING

Strand Hall 3038
8888 University Drive
Burnaby B.C. Canada V5A 1S6

TEL + 1 778 782 5433
vpastrat@sfu.ca
sfu.ca/vpacademic/our-role/support-services/learning-teaching.html

MEMORANDUM

ATTENTION: Department of Statistics and Actuarial Science; SCUP; Senate

FROM: Paul Kingsbury, Associate Vice-President, Learning and Teaching pro tem
and Alice Campbell, Senior Consultant, Program Assessment, Learning Experiences Assessment and Planning

RE: Department of Statistics and Actuarial Science Assessment Plan for Educational Goals associated with 2023/24 Mid-cycle Report

DATE: October 2, 2024

The Department of Statistics and Actuarial Science has recently submitted its mid-cycle Educational Goals (EG) assessment plan to SCUTL. We have reviewed the Department's plan in conjunction with your external review midcycle report

In your plan, you note that the department offers three undergraduate programs: the Major in Statistics, the Major in Actuarial Sciences, and the Data Science Major, which is run jointly with three other units (Mathematics, Computing Science, Beedie School of Business). While there have been significant changes to the Actuarial Science program, and Educational Goals are being developed for the Data Science major program, the Assessment Plan focuses on the Major in Statistics.

We appreciate and endorse your approach to assessing this program's Educational Goals using direct assessment of student learning through a range of mainly upper division courses. For Educational Goals 3 and 5, we note that you will be collecting data from a particular rubric category aligning to the Educational Goal. For Goals 2 and 4, the plan indicates that you will collect and analyse final exam scores. These may be too broad. We recommend using the approach you mention in Goal 1, which is to identify particular exam questions that align with the Educational Goals you want to assess. For Goal 1, we note that the course mentioned is a lower level course; we generally recommend looking at upper level courses as these will indicate if students are attaining these goals at or nearing the end of their programs. For all, we would recommend analysing and reporting on the proportion of students who attain the benchmarks that you have set.

We appreciate how concise your plan is. Nevertheless, it would be helpful to provide some additional detail so that we can better understand how the work proposed and the courses you identified fit within the overall undergraduate program and any changes you may be making to the program in the coming years. We are unsure about the rationale used to select the courses listed (are they required? frequently offered with high enrolment? courses where the given program-level Educational Goal is clearly aligned with the course-level educational goals?).

We appreciate the description of the significant program-level changes made to the Actuarial Sciences program, with changes taking place in this academic year. This report would have benefited from detailing, even provisionally, how the Department plans to assess these wide-ranging changes. We anticipate that your Educational Goals assessment report in your next external review will include assessment of these changes, as well as the Educational Goals for the Data Science program.

As you begin to carry out this work, staff in the AVPLT portfolio are well equipped to support you, and want to help ensure it is meaningful and manageable for the Department. The LEAP (Learning Experiences Assessment and Planning) team supports program and Educational Goals assessment. Their supports include assessment design, quantitative and qualitative data collection and analysis, and support with data interpretation. The Centre for Educational Excellence can help with program revisions and course re-designs that you may be planning.

SFU SIMON FRASER UNIVERSITY

Mid-Cycle Educational Goals Assessment Plan

Unit/Program: Statistics and Actuarial Science

Contact name: Derek Bingham

Date: June 11, 2024

This template is designed to help units implement assessment of Educational Goals after receiving feedback from their External Review. Units are not expected to assess every Educational Goal every year. *(Textboxes will expand as you type)*

1) **Who were the members of your Educational Goals Assessment team?** Outline who has worked on the assessment.

Derek Bingham (Department Chair) and Barbara Sanders (Actuarial Science Group Leader). The entire unit contributed to updated learning outcomes under the previous Chair's guidance.

2) **Are your program's Educational Goals current, or do any of them need to be revised?**
In some cases, Educational Goals may need to be revised to keep apace with changes in the discipline or in the program's course offerings, or to ensure they continue to align with a unit's mission and values. Feedback from the External Review may inform revision of Educational Goals.

The Department runs three undergraduate programs: (i) Actuarial Science (ii) Data Science; and ; (iii) Statistics;

Since the external review, the educational goals of the major and honours programs in actuarial science were revised significantly to better reflect the unique requirements of this professionally oriented program. The new educational goals were developed with assistance from CEE and considered faculty feedback, student experience, enrollment, accreditation requirements, and employer expectations with respect to both technical and soft skills. The new goals address six categories: subject matter expertise, disciplinary awareness, critical thinking and problem-solving skills, communication skills, and other skills and habits of mind valued beyond the classroom. Detailed goals within each category were developed at each level (100-400). Comparison of the detailed goals with the existing curriculum revealed small gaps in subject matter expertise and significant gaps in the other categories. In response, several changes were made to the undergraduate curriculum in actuarial science, including adding a new course (ACMA 231) to develop relevant computing and decision-making skills, reorganizing and modernizing the short-term insurance course sequence (formerly ACMA 355/455/470, now ACMA 321/421/422), and replacing the requirement for two ENGL or PHIL courses with BUS 217W (Critical Thinking in Business). Work is underway to reorganize and modernize the long-term insurance sequence (ACMA 301/401/475) and to rethink coverage of key investment concepts (we are working with the Beedie School of Business on this).

The Data Science program is undergoing changes at the moment in response to interviews with students and monitoring of student progress.. In short, students complained that the degree program had too many required courses in each of the four main disciplines – they were not wrong. These changes have prompted the ongoing development of educational goals specific to this program.

The Statistics degree educational goals were reviewed, but not changed. The assessment plan below refers specifically to this program.

3) Is your program's curriculum map up to date?

A curriculum map may need to be updated to reflect any major changes to the program's course offerings (i.e. new or substantially revised courses, courses that have been removed).

The Actuarial Science curriculum map needs to be updated to reflect both the new educational goals and the new courses. An assessment plan specific to the new goals is being developed with CEE, with the first round of assessments expected in the 2024-2025 academic year, when the new curriculum takes effect.

The Data Science curriculum map is changing to reflect new program changes. These changes should enable a greater streamlining of the program and to remove bottlenecks to student progression, whilst integrating forthcoming changes in the educational goals.

The curriculum map does not need to be updated at the moment in Statistics.

4) Assessment Plan

For each Educational Goal, outline what data you will use to assess student learning. Indicate what direct evidence you will draw on - which key courses you will sample from and, if possible, the course-based assessments you plan to use. These can be described in general terms (e.g. research paper, final exam questions targeting a particular Educational Goal). Indicate also whether or not you plan to gather indirect evidence (e.g. surveys, focus groups, interviews, etc.). The same indirect evidence method (e.g. a survey) can be used for multiple Educational Goals. Describe what would indicate to you that students had met the Educational Goal. Add or delete rows as needed.

Educational Goal 1: *Demonstrate competencies with respect to the data collection phase in the statistical sciences; the competencies include sampling, design and data management*			
Description of Assessment Methods: • Final exam questions targeting sampling and data management in STAT 240	**What would indicate that students had met the EG?** Mark of 70% or higher on each of the selected questions	**Is this direct or indirect?** Direct	**When do you plan to collect the data?** Fall 2024

Educational Goal 2: *Analyze data; statistical and data science skills including the identification of suitable models/methods and the knowledge of the associated strengths and limitations, proficiency with relevant software packages and data management competencies*			
Description of Assessment Methods: • Mark on STAT 350, STAT 445, STAT 452 and STAT 475 final exams	**What would indicate that students had met the EG?** Mark of 70% or higher	**Is this direct or indirect?** Direct	**When do you plan to collect the data?** Fall 2024
Educational Goal 3: *Communicate the results from data analyses; these competencies include the interpretation of inferential and data science procedures, report writing, presentation skills and the ability to produce effective visualizations*			
Description of Assessment Methods: • One technical report assignment in STAT 300W • One presentation assignment in STAT 300W • Statistical consulting report assignment in STAT 300W	**What would indicate that students had met the EG?** Score corresponding to "meets expectations" category or better in rubric for each assignment.	**Is this direct or indirect?** Direct	**When do you plan to collect the data?** Spring 2025
Educational Goal 4: *Assess the associated theory related to models/methods in advanced courses*			
Description of Assessment Methods: • Mark on STAT 330 final exam	**What would indicate that students had met the EG?** Mark of 70% or higher	**Is this direct or indirect?** Direct	**When do you plan to collect the data?** Fall 2024
Educational Goal 5: *Carry out research and develop procedures in the context of nonstandard applications*			
Description of Assessment Methods: • Project report from STAT 403 • Project report from STAT 445 • Project report from STAT 452	**What would indicate that students had met the EG?** Score corresponding to "meets expectations" category or better in rubric for each assignment.	**Is this direct or indirect?** Direct	**When do you plan to collect the data?** Spring 2025

5) How do you plan on sharing your findings within your unit?

The results will be shared with unit members at a Department meeting
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6) Assessment Timeline

Next External Review: 2027