

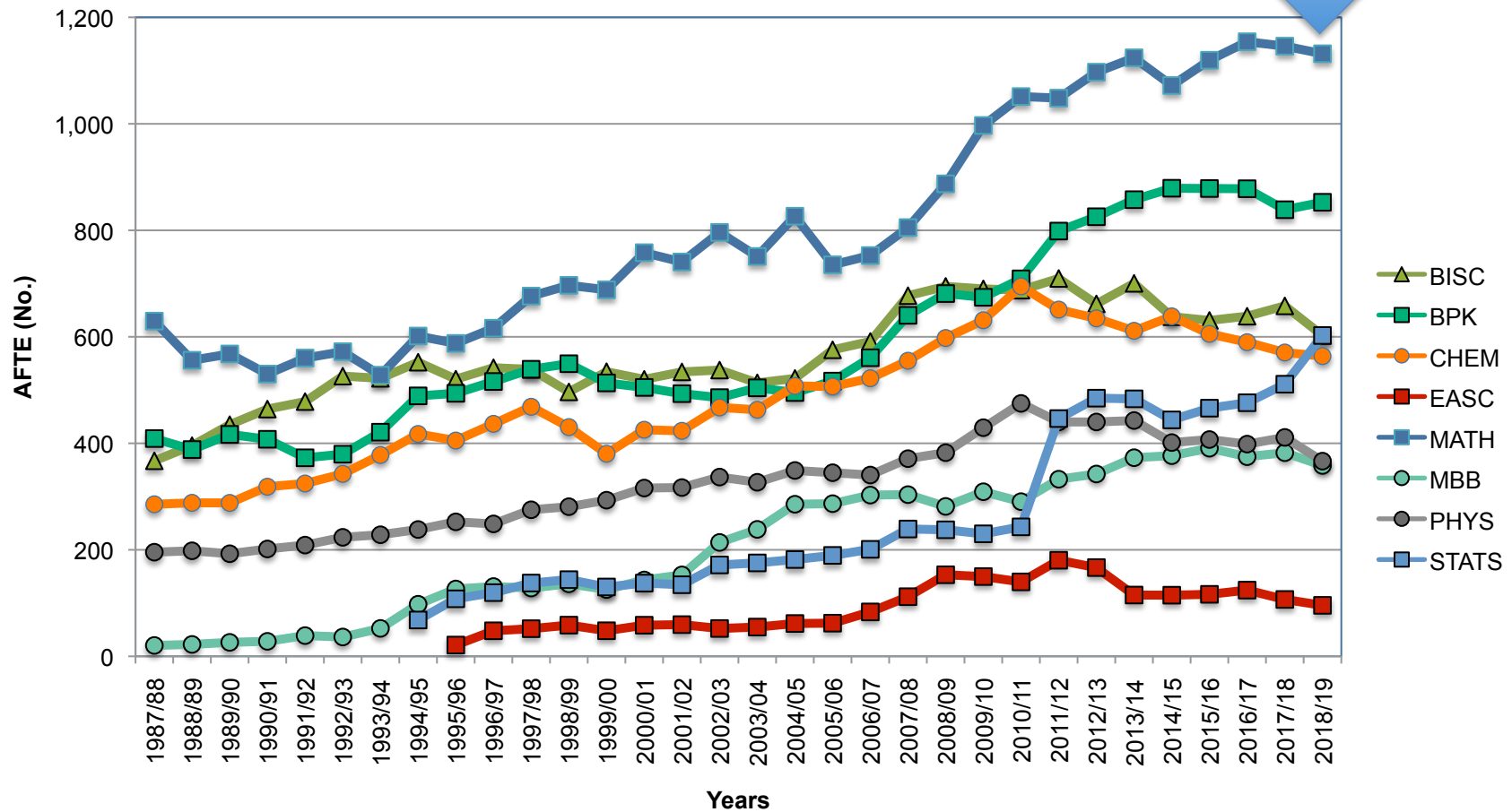
First Year Math Courses

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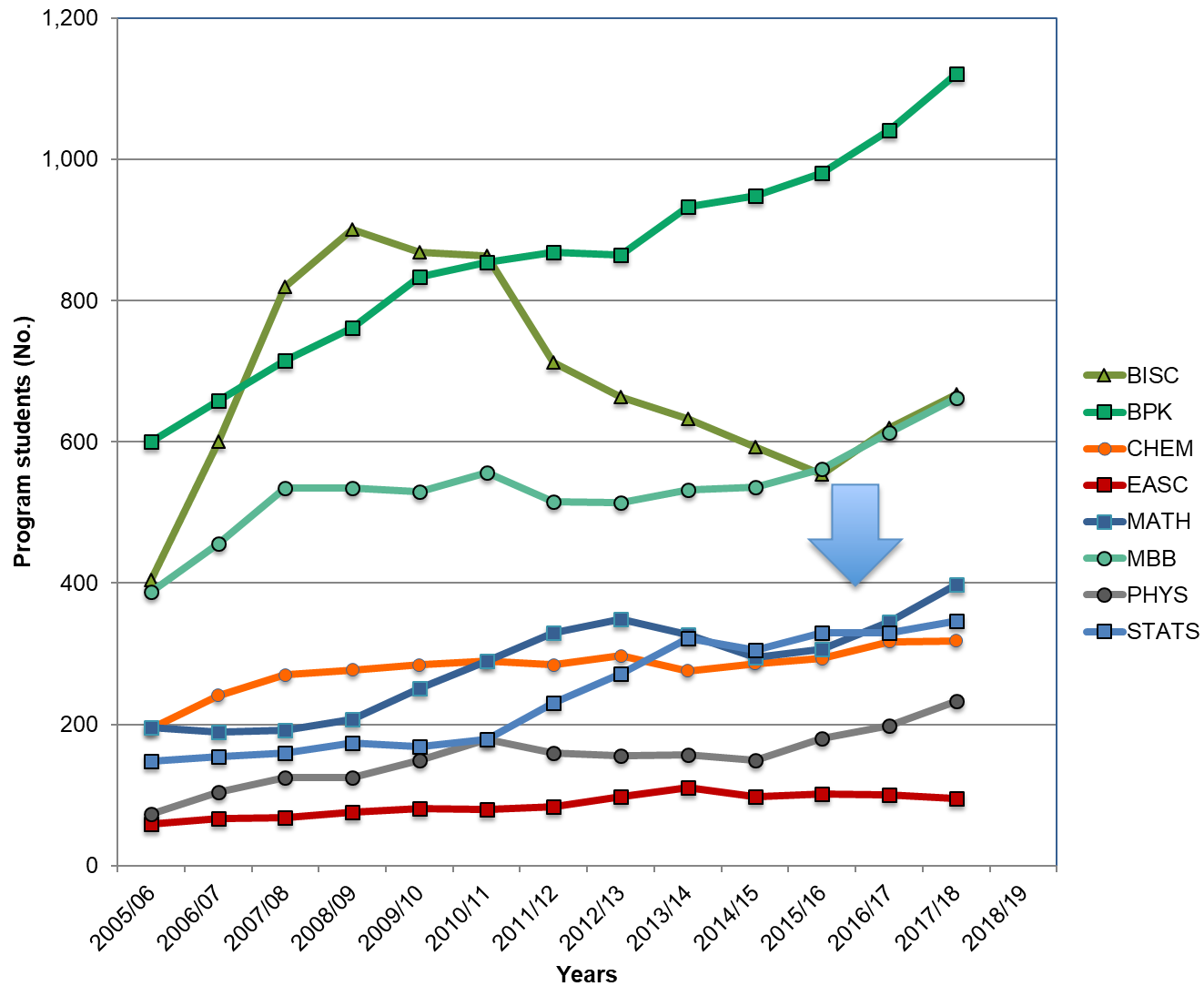
SFU Faculty of Science

Math



Note: 1 AFTE = 30 credit hours

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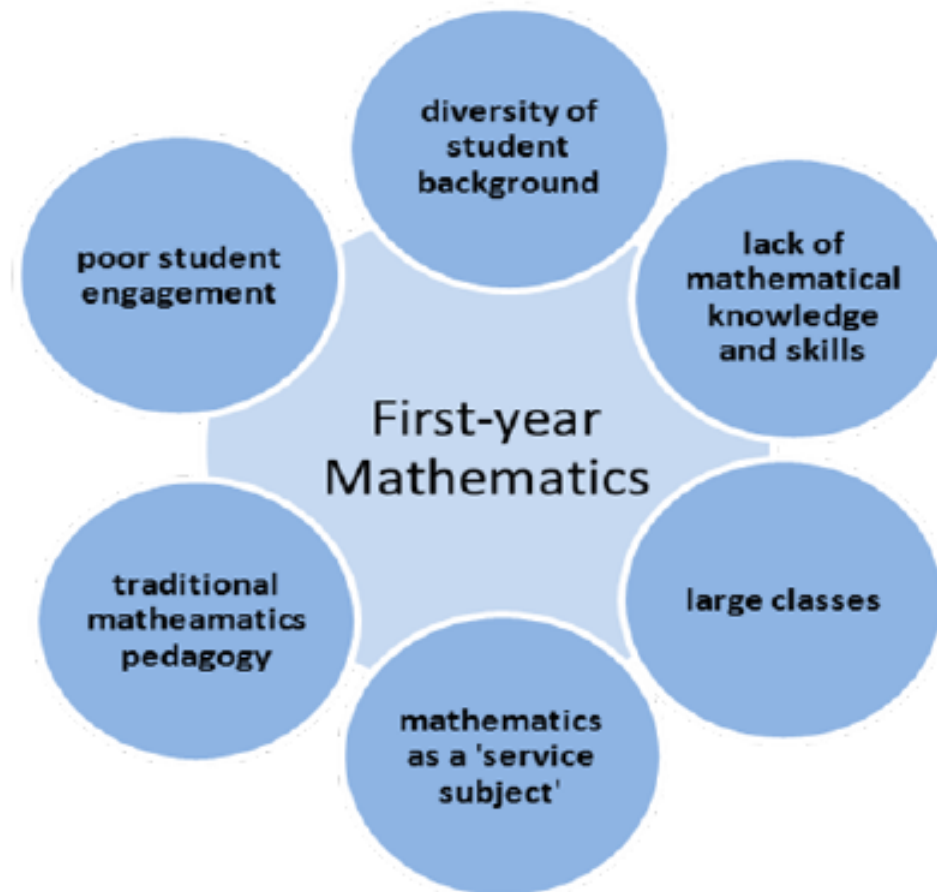
SFU First Year Math Courses

- Foundations of Analytical and Quantitative Reasoning - All
- Precalculus - All
- Calculus I, II - Sciences and Engineering; Business and Social Sciences; Life Sciences
- Geometry for Computer Graphics – Interactive Art
- Linear Algebra - Sciences and Engineering
- Discrete Mathematics – CS and Math

Faculty

Teaching		Research	
9		31	
Female	Male	Female	Male
5	4	5	26

Challenges For First-Year Mathematics Teaching



FYiMaths Project, 2012-2014, Australia

FYiMaths

- Led by Dr. Deborah King, University of Melbourne
- Funded by the Australian government Officer for Learning and Teaching.

FYiMaths

- To promote and support **strategic change and improvements in first-year learning and teaching in the mathematical sciences** throughout the Australian higher-education sector, with significant benefits for the student experience.

The United States

- MAA
 - Characteristics of Successful Programs in College Calculus (2009)
 - Progress through Calculus (2015)
 - Precalculus to Calculus: Insights and Innovations Conference (2016)
 - Guide to Evidence-Based Instructional Practices in Undergraduate Mathematics (2018)

The United States

- AMATYC, AMS, ASA, MAA, and SIAM jointly sponsored “The Common Vision”: project with the ultimate goal to “**galvanize the mathematical sciences community** around a modern vision for undergraduate programs and to spur grassroots efforts within the community as a foundation **for addressing the collective challenges we face**”

“A Common Vision for Undergraduate Mathematical Science Programs in 2025” (Saxe & Braddy, 2016)

- “(...) **the status quo is unacceptable**. The specific areas that all the guides agreed require significant further action fall into one of four categories: **curricula, course structure, workforce preparation, and faculty development**. These are, of course, interdependent and do not exist in isolation; (...) **Improving teaching and learning requires well-coordinated efforts by multiple stakeholders**, including faculty, administrators, employers, professional associations, and funding agencies.”

The Notices of AMS – January 2019

- “**Most significant** results, events, or developments in undergraduate mathematics education of the last decade”:
 - **Curricular Pathways**
 - **Pedagogical Innovation**
 - **Demographic Changes**
 - **Expanding Career Options**
 - Ron Buckmire, A Survey of Significant Developments in Undergraduate Mathematics Education Over the Past Decade

Expanding Career Options:

In 2012, the President's Council of Advisors on Science and Technology (PCAST) castigated the mathematics community for instruction that was “dull and unimaginative,” **recommending that introductory courses be turned over to** “faculty from mathematics-intensive disciplines other than mathematics.”

- Ron Buckmire, A Survey of Significant Developments in Undergraduate Mathematics Education Over the Past Decade

Canada

“Canada’s university mathematical teaching community is facing a number of significant challenges and opportunities. These range from **managing increasingly diverse classes** of incoming students, to understanding and addressing the **impact of modern technology on teaching** and delivering courses, to **keeping course content relevant** for various academic programs and, most importantly, to effectively **supporting students to achieve their personal, academic and career goals.**”

Jungic and Lovric: “Call for National Dialogue: The Present and Future of Teaching First Year Mathematics at Canadian Universities” (CMS Notes, 2017)

2017 - 2019

- 2017 Canadian Mathematics Education Study Group Meeting in Montreal, Quebec, Working Group **“Teaching First Year Mathematics Courses in Transition from Secondary to Tertiary”**
- 2017 Canadian Mathematics Society Winter Meeting, Education session **“Rethinking First Year Experience”**
- 2018 **“First Year University Mathematics Across Canada: Facts, Community and Vision”** conference. Fields Institute in Toronto, Ontario
- 2019 **“First Year Mathematics Repository Workshop”** in the Banff International Research Station (BIRS) in Banff, Alberta.

Common:

- Talent and innovation
- Young people
- #(Female) about the same as #(Male)
- Strong feelings against the commercialization of learning resources
- “It felt like a community I have been seeking for a long time.”

Personally...

... it became apparent that in Canada answers to the set of common challenges in teaching first-year mathematics courses may depend on the **size of the university** (large vs. small), **institution's mandate** (research intense vs. teaching intense), **financial model** (public vs. private), **geographical location** (have vs. no-have provinces), and so on.

Banff 2019

How do different institutions and different instructors find the balance between introducing a relatively complex math content and meeting the needs of the specific program that the course “services”?

Banff 2019: Some Conclusions

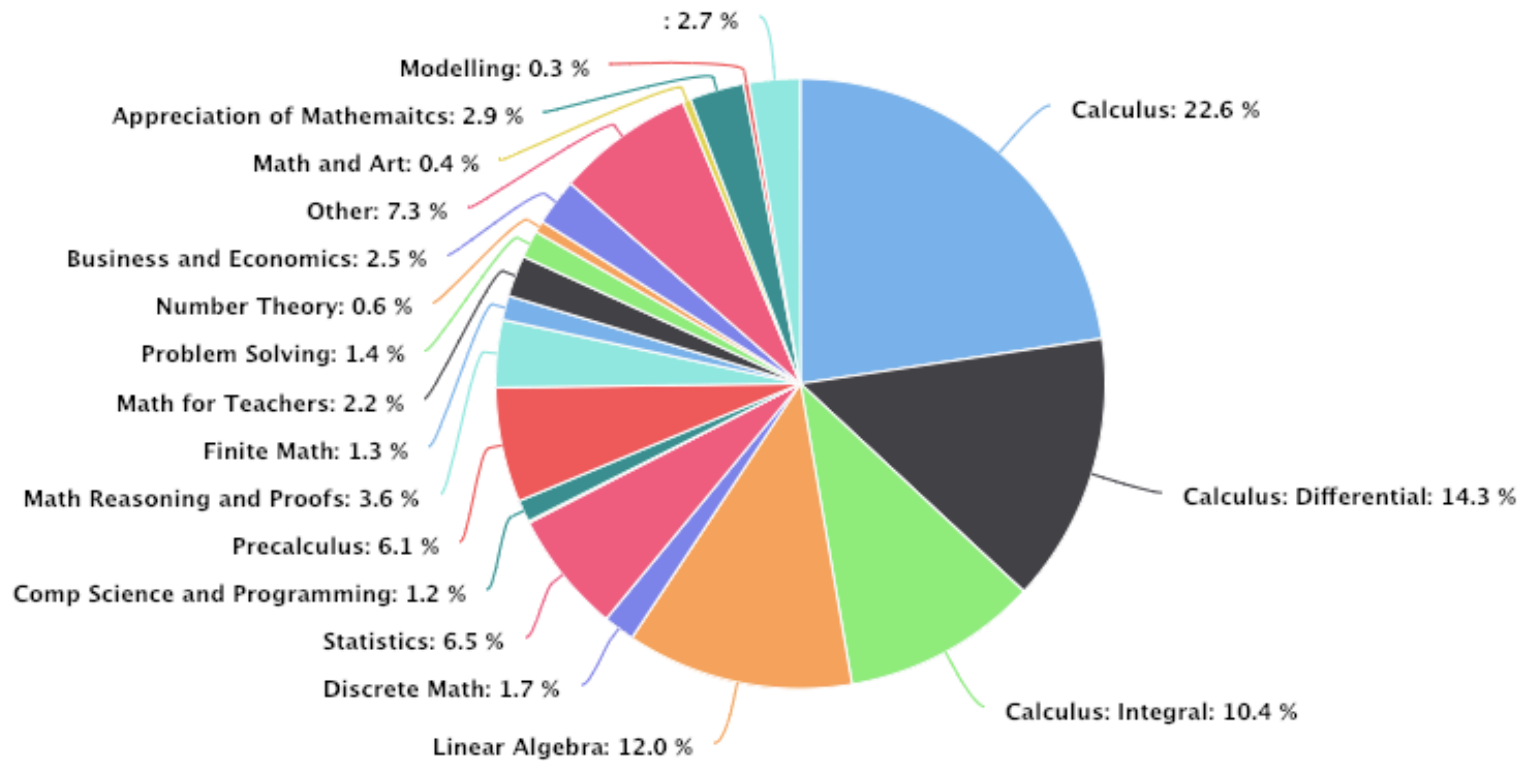
- Service courses provide **unique opportunities** to teach mathematics that is interesting, exciting, and stimulating, and that addresses *authentic life situations*. This is where we are forced to re-think the mathematics content, to benefit not only service courses, but all math courses.
- Service courses are mostly **taught by younger instructors**; often they are on limited-term contracts or hold more permanent, but non-tenure track positions.
- A successful design of a service course requires **continuous communication** with faculty in all departments whose students will be taking the course.
- Much-needed **innovation** in math and stats instruction happens in service courses!

First Year Mathematics and Statistics Courses Repository

- Shareable dynamic **online database** contains extensive data collected from mathematics and statistics instructors across the country.
- Data includes course content, resource and technology used, learning outcomes, modes of delivery, connections with other courses, as well as informal descriptions of various practices in teaching these courses.

What Do We Teach?

First Year Math – Course Subjects



Next: Edmonton, Alberta

- May 3-5, 2019
- University of Alberta and PIMS
- “First Year Math and Stats in Canada: Time to Rethink our Curriculum?”

Next: Mississauga, Ontario

- May 22-24, 2020
- University of Toronto Mississauga

Next: Math Kafés

- Supported by CMS
 - One-day events
 - Various locations

Thank You!

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