

THE BRITISH COLUMBIA COMMITTEE ON THE
UNDERGRADUATE PROGRAM IN MATHEMATICS AND STATISTICS

Minutes of the 97th Meeting, May 14th - 15th, 2019
College of the Rockies

Version: June 5, 2020 Draft

Tuesday, May 14, 2019

Plenary Session

1. **WELCOME**

Darrell Bethune, Dean of Business and University Studies, College of the Rockies, welcomed the BCcupms to its 97th meeting at College of the Rockies.

9:00

2. **ADOPTION OF THE AGENDA FOR THE 97TH MEETING OF THE BCCUPMS**

The agenda for the 97th meeting was approved by consensus after agreeing to the following change: Addition of item 5.3: Remembering Betty Kennedy – David Leeming.

Motion: (moved by Suzanne Feldberg and seconded by Gary MacGillivray)

That the Agenda for the 97th Meeting be approved as ammended.

Approved by consensus

3. **APPROVAL OF THE MINUTES OF THE 96TH MEETING HELD AT CAPILANO UNIVERSITY**

Motion: (moved by Suzanne Feldberg and seconded by Wayne Broughton.)

That the Minutes of the 96th Meeting be approved without changes

Approved by consensus

4. **ANNOUNCEMENTS**

4.1 **Announcements from the host:** Andrea Hyde gave the committee information about internet access and meal options for the meeting.

4.2 **Introduction of representatives.**

4.3 **Attendance lists:** Suzanne Feldberg circulated the attendance lists.

4.4 **BCcupms: Notice of election:** At this meeting, elections for the Vice-chair and Secretary of the BCcupms will be held. These have two-year terms.

Formation of a Nominating Committee: Jane Butterfield, Ana Culibrk, Gary MacGillivray, and Susan Oesterle volunteered to form the nominating committee.

4.5 **Conferences:** Members brought the following upcoming conferences to the committee's attention.

CMS Summer meeting in Regina (June 7 - 10). <https://summer19.cms.math.ca/>

Changing the Culture (May 17). <https://www.pims.math.ca/educational/changing-culture>

CMESG (May 31 - June 4). <http://www.cmesg.org>

Stats Society of Canada annual conference in Calgary (May 26 - 29). <https://ssc.ca/en/meeting/annual/2019>

5. REPORTS

5.1 **Ministry of Education** – no representative was available this year, but they sent a presentation. For questions, please contact Angie Callenberg at Angie.Calleberg@gov.bc.ca. The slides are available at <http://www.bccupms.ca/> in the 97th Meeting Documents.

The committee discussed this presentation. Committee members wondered what teachers were doing to collaborate and to share resources, given that the Ministry is not requiring specific textbooks. Committee members also discussed what they could do to help support the teachers feel prepared to offer courses from the wide range of new mathematics courses, and how many schools were like to be able to offer them. In particular, Asia Matthews mentioned the First Year Math Instructors across Canada repository (see <https://firstyearmath.ca>), and Bruce Dunham mentioned a repository and forum he is creating for high school teachers who are preparing to teach the new statistics course (see <https://statspace.elearning.ubc.ca>).

5.1.1 BC Ministry website:

<https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-ministries/education>

5.2 **BCCAT** – Dr. Fiona McQuarrie, Special Projects Coordinator

5.2.1 Flexible Pre-Major: (See posted document at www.bccupms.ca).

For a student to actually transfer with a flexible pre-major, there needs to be a member of the sending institution as well as a member of the receiving institution who knows about and understands the flexible pre-major. BCCAT considers the current practice to be unsustainable, and has three recommendations they would like articulation committees to consider. Those recommendations are on pages 3 and 4 of the posted document. They are certainly not the only courses of action; if articulation committees come up with a different solution that is of course fine too.

Action item: This will be discussed tomorrow during the Math Parallel Session.

5.2.2 BCCAT: International Course Transfer Database initiative.

Last Monday, UBC's internal transfer guide became available to the public. <https://students.ubc.ca/enrolment/registration/transfer-credits/search-tool> Douglas College has expressed an interest in doing the same thing, and BCCAT will be working with them next. It is BCCAT's hope that more institutions will do something similar.

Susan Oesterle asked whether BCCAT had plans to host or amalgamate these various transfer guides, so that users would not need to go through a variety of institutions' websites to gather the information. Fiona McQuarrie responded that this discussion has not yet taken place.

5.2.3 BCCAT: Engineering Common Core project. (See posted link at www.bccupms.ca).

This report has now been completed and published, and is available at <https://www.bccat.ca/articulation/arts/engineering>.

5.2.4 BCCAT: 2018 and 2019 JAMs.

This is BCCAT's 30th anniversary. In honor of this event, special events will be scheduled for the 2019 JAM.

5.2.5 BCCAT: Pending Requests in the Transfer Credit Evaluation System (TCES).

Please see the list of pending requests in the meeting folder.

Other activities and events that Fiona McQuarrie brought to the attention of the committee: EducationPlannerBC is no longer being run by BCCAT, and is now being run by a not-for-profit organization. BCCAT has developed a policy on respectful behaviour, which is posted at

<http://www.bccupms.ca/> in the 97th Meeting Documents. BCCAT is undertaking a research study on students who have taken dual-credit courses in high school: are they more likely to attend the post-secondary institution at which they took the course? how do those students' performance in post-secondary compare with students who did not take a dual-credit course?

5.3 Remembering Betty Kennedy – David Leeming.

David Leeming said a few words to commemorate Betty Kennedy, the first secretary of the BCCUPMS, who passed away at the age of 96 last month.

5.4 PIMS—David Leeming.

David Leeming reported on the various educational outreach activities run this year by the PIMS Education Associates. He particularly put out a call for institutions who are interested in participating in the Canadian Math Kangaroo Contest; please contact David for more information. <https://kangaroo.math.ca>

Please see the full report on page 31 for details, and contact David Leeming if you are interested in making your institution a PIMS Education Associate.

5.5 ABE—Costa Karavas.

5.6 Changing the Culture. Please register in advance: Friday, May 17, 2019.

6. INSTITUTIONAL REPORTS

11:25

ACSENDA SCHOOL OF MANAGEMENT – No representative sent

ALEXANDER COLLEGE – Krishna Subedi

Alexander College (AC) is a private college with its student body consist of primarily international students. To maintain diversity, college is working on a long-term diversification strategy, with goals to ensure that no one nationality can represent more than 50% of its student body.

Enrolment and Course Offerings

AC continued to experience growth in students' number, setting institutional records for Spring 2018 (2184), Fall 2018 (2505), and Winter 2019 (2585). As such, the number of course offerings each term continues to increase to accommodate our enrolment growth. With regards to mathematics courses, enrolments have been good. We offered 18 sections of math courses in Spring 2018, 20 sections in Fall 2018 and 19 sections in Winter 2019. But there are no changes to the current courses that require articulation activity. Here is the breakdown of the enrollment in mathematics courses for the last three terms.

Course:	Spring 2018		Fall 2018		Winter 2019	
	# sections	# student	# sections	# students	# sections	# students
Math 099: Fundamentals of Algebra with Trigonometry	3	98	1	34	1	35
Math 100: Precalculus	3	106	7	242	6	175
Math 104: Calculus I for Business	5	159	5	174	5	173
Math 105: Calculus II for Business	3	87	2	69	2	70
Math 115: Discrete Mathematics	0	0	0	0	0	0
Math 151: Calculus I	1	35	1	35	2	69
Math 152: Calculus II	1	20	1	24	1	35
Math 232: Linear Algebra	1	35	1	35	1	35
Math 251: Multivariable Calculus	1	29	1	32	1	34
Math 255: Ordinary Differential Equations	0	0	0	0	0	0
Stat 200: Introduction to Statistics	0	0	1	34	0	0
Total	18	569	20	679	19	626

Student Grades/Performance/ Attendance

Success rates across the institution have declined. This is not different in mathematics courses. The academic readiness, academic motivation and poor attendance of our students, particularly those from India, is a growing concern at AC. Multiple research and data analysis projects are underway to determine how we can mitigate this complex issue and some initiatives have already been implemented (e.g. capping of applications for admission, priority registration).

Regarding attendance, the college had a minimum attendance policy of 70% in all subjects (and 90% for UPRE). But this policy was retired as an institutional policy, effective from the Winter 2019 term. Mathematics department, however has decided to stick to the 70% attendance policy to address the poor attendance problem. According to this policy, students must maintain minimum of 70% attendance to be eligible to write the final exam.

Our Writing and Learning Centre (WLC) continues to effectively assist a large portion of our student body avoid plagiarism (remediation workshops), develop their writing skills, and receive subject-specific tutoring.

Institutional Developments

A 5-year internal and external academic review of our Associate of Arts degree was undertaken over the past year.

A large-scale administrative restructuring took place over the past year. AC's board approved the appointment of a new Campus Operations Manager, Director of Student Affairs, Registrar,

Associate Dean of Arts and Sciences, six academic Department Heads (English for Academic Purposes, English, Humanities and Social Sciences, Math and Science, Commerce, and Economics), as well as two academic Department Coordinators (EAP and MATH).

We launched a new student information system, MyAC, in October 2018. The system was developed in-house over several years, and is comprised of dedicated administrative portals for administration, staff, faculty, and students. Canvas remains our chosen LMS.

AC have acquired a new facility for its Burnaby location (pending zoning change). The new location is significantly larger than the current location. The location will have 13 additional classrooms than we currently have, and increased space allocated for academic department heads and faculty.

BC INSTITUTE OF TECHNOLOGY – Simin Jolfaee

At BCIT we haven't had any major changes to our programs and courses that would affect our articulation activity. The enrollment numbers have been steady and growing, especially in computing programs, which have been expanded and include new intakes at the downtown campus.

CAMOSUN COLLEGE – Patrick Montgomery

The Department of Mathematics and Statistics at Camosun College has seen relatively stable enrollment this year, with a slight overall decrease of 1.7%. The only identifiable trend is that the decrease is likely attributable to a drop in enrollment for our tuition-bearing ABE courses which are now offered tuition-free through the school districts (both in house and through distance education). To adapt to this change in government policy, two advanced level ABE courses (MATH 135 – advanced business, and MATH 137 – advanced algebraic) have been revised and re-articulated as MATH 075 and MATH 077. In addition, a section of provincial level algebra and trigonometry (Precalculus), MATH 097, has been introduced and articulated on the ABE grid. All three of these courses will commence in Fall 2019. The only other change to our courses this year affected the Engineering Transfer Program, which now uses a more applied version of linear algebra, MATH 251 (matrix algebra for engineers). Staffing levels have experienced a slight growth as two members with part-time continuing appointments were increased to full-time.

CAPILANO UNIVERSITY – Paul Ottaway

Enrollment in Math and Stat courses has increased slightly due to a sharp increase in international students and a slight decrease in domestic students. The School of STEM is continuing the process of developing multiple Bachelor of Science degrees. A General BSc is slated to have its first intake in Fall of 2020. Students will be required to select two concentrations from the following list of three: Biomedical Science, Clean Technology, Computational Science (which covers a range of topics from Math, Stats and Comp Sci). Additional BSc degrees will be available in the following year (Fall 2021) with majors in Data Science, Applied Clean Technology and Life Science. In conjunction with these degrees, many upper year courses are being developed with Math, Stats and Comp Sci most directly contributing to the Data Science major. For some of our upper year offerings, we are considering using the "DATA" prefix for courses that are interdisciplinary in nature though they will be housed in the Department of Computer and Data Science. The mathematics department also plans to revisit the outline, content and learning outcomes for Math 108 / Math 109 (Calculus 1 and 2 for Life Science, Social Science and Business) to better serve students in these programs while maintaining articulation. We have hired four new members to the department this year: Amir Amiraslani (regular, permanent), Mahta Khosravi (regular, permanent), Peter Sinclair (1 year contract) and Danielle Wills (sessional). If enrollment continues to increase at the current pace, we expect an additional hire may be needed as early as next year.

COAST MOUNTAIN COLLEGE – Erfan Zahrai

Courses:

	Fall Semester	Winter
Terrace	Math 101 Calculus I	Math 102 Calculus II
Terrace	Math 131 Introduction to Statistics	Math 131 Introduction to Statistics
Terrace		Math 235 Linear Algebra
Rupert	Math 101 Calculus I	Math 102 Calculus II
Rupert		Math 131 Introduction to Statistics
Video Conf.		Math 115 Precalculus
Online	Math 190 Mathematics for Elementary Teachers	

Enrollment:

The numbers in Math 101 & Math 131 at the Terrace campus and Math 115 are significantly up due to an influx of international students.

Textbook:

- OpenStax for both Calculus and Precalculus.
- Essentials of Statistics, Triola
- Linear Algebra and Its Applications, Lay
- Mathematics for Elementary Teachers, Musser

Software:

Desmos, Maple and Mathematica
D2L Learning Management System

Math Contest:

We had three schools participating in the final round:

1. Prince Rupert Middle School: 4 students in grade 8.
2. Charles Hays Secondary School – Prince Rupert: 3 students in grade 10, 3 in grade 12.
3. Smithers Secondary – 3 students in grade 10, 3 in grade 12.

COLLEGE OF NEW CALEDONIA – Tracy Wall

Over the past year our enrolments have remained high due to our large international student population. We have completed, and had approved, our Associate Degree in Mathematics and Computer Science, which will begin Fall 2019. The program requires the re-articulation of two courses: Math 203, Real Analysis due to the expiration of articulation agreements, and Math 190 to change it from 4 credits to 3 credits. As well, notifications will be coming through for name changes for several of our courses:

Course

Math 101 Calculus I
Math 102 Calculus II
Math 201 Calculus III
Math 202 Calculus IV
Math 104 Introduction to Statistics
Math 165 Calculus for Non-Science Majors

New Name

Differential Calculus
Integral Calculus
Multivariable Calculus
Vector Calculus
Elementary Statistics
Applied Calculus for Social, Economic,
and Life Sciences

Math 190 Principles of Mathematics for Teachers
Principles of Mathematics for Elementary
Teachers

Math 203 Introduction to Analysis
Real Analysis

Math 215 Differential Equations I
Ordinary Differential Equations

We have cross-listed two courses with the Computer Science Department. These courses are being sent through for articulation: Math 135/CSC 135 Discrete Mathematics I, and Math 235/CSC 235 Discrete Mathematics II. Students will be able to take these courses for credit in the discipline of their choice.

We are developing a new first year, two semester math course for the Civil Engineering Technology Program which will begin in Fall 2020.

Overall, the past year has seen growth and excitement in our department with the new programs, and the offering of several of our second year courses that have not been running for several years. We hope to see this positive growth and progress continue into the future.

COLLEGE OF THE ROCKIES – Andrea Hyde

In the 2018/2019 year, the increase in international students continued to be a challenge at College of the Rockies, but there have been a number of systems implemented to improve the experience for students and instructors. We've opened up smaller sized sections exclusively for international students, and set up paired sections where there are a designated number of seats for international and domestic students in any given classroom. In general, it seems that the increased screening of math and English has lead to better performance in the classroom. International students are now required to arrive in May for orientation to give them time to acclimatise to Cranbrook and find housing, work etc. before trying to settle into classrooms full time.

We have been considering offering a blended pre-calculus and calculus course where students would learn the skills from pre-calculus (trig functions, for example) and then immediately learn the related calculus concepts. In a perfect world, the course would run in the same time block as calculus so that students could easily move to the blended course if they needed to.

Finite Math 2 (Math 102) is on the table to change into a discrete math course. We are working towards a first year computer science program and plan to use Math 102 to fulfil the mathematics requirement in that program. We are still in the research phase of that process and will be working on it over the summer with plans to offer it starting in Fall 2020.

We completed work on a second Math for Teachers course (Math 107) that we are offering in the Winter 2020 semester. We moved some material from the first Math for Teachers course (Math 105) to Math 107 and expanded on the material with a particular emphasis on indigenization in both of the courses.

COLUMBIA COLLEGE – Ana Culibrk

As of September 1st 2018 we have a new principal Ms. Robin Hemmingsen and two vice-principals. We used to have only one vice-principal, but since the College has grown significantly in the last

several years, the need for an additional administrator has arisen.

Columbia College has created the new five-year academic and strategic plans.

Regarding the Math Department, Peter Hurthig – one of our long term instructors retired at the end of the last calendar year. Currently we have 8 regular and 4 sessional instructors.

In in the last 2 years we have adopted Wily Plus online support for our Calculus for Science and Calculus for Business/Social Science courses. It seems that our students benefit from doing the on-line homework, so this term we also adopted Wily Plus for both of our precalculus courses.

Each semester 5 second year math courses are being offered.

The enrolment in the math courses this academic year is very slightly lower than the last year's enrollment.

Academic year	2017/18	2018/19
Number of sections of UT Math Courses	69	68

COQUITLAM COLLEGE – Gera Belchev

There are no course changes in the past year. The student enrolment is strong.

DOUGLAS COLLEGE – Natasha Davidson

KWANTLEN POLYTECHNIC UNIVERSITY – Michael Nyenhuis

Kwantlen has no changes to courses. Enrolments have been steady, at least in the math department. Some of you may have heard about KPU's financial problems. We have been required to cut courses for the next few terms. This term we cut all that was debatably fat, so the next cuts will be difficult.

The B.Sc. in Applications of Math is doing well. I believe we have about 30 students in it. We will be graduating about 5 students in June.

LANGARA COLLEGE – Eugene Belchev

Last year the department went through a Program Review exercise. No new courses were added, though as a result of the review, the learning outcomes of the existing ones were somewhat modified and therefore in need for re-articulation.

Due to recent retirements as well as increase in demand, we hired several new instructors in all of the subareas of the department.

There was a significant drop in enrollment during Spring because we did not bring in as many international students as before. But for Summer their number has been brought back to previous numbers and we even managed to increase domestic registration, thus overall numbers remain stable.

The Engineering Transfer program continues to be quite popular. We have been running MATH 1252 , Linear Systems with Applications, since Spring 2014 as part of the Engineering timetable. This course (which incorporates biweekly MATLAB labs) was designed to meet the learning outcomes for a first year Engineering Linear Algebra course.

The new PDD program in Data Analytics was launched in January 2019. There are two intakes a year Ð January and September. It runs as cohort with 30 students each. The program has 46 credits and is a collaboration among Math & Stats department, CSIS, English, Business departments. Fall 2019 admission is almost complete with over 190 applications.

As a part of the IUP (Indigenous Upgrade Program) our colleague Sonoko Nakano in consultation with Nora Franzova and Melania Alvarez Aidem (UBC) prepared 26 weeks of a remedial math course to be taught at Musqueam, that would allow students from Musqueam to complete high school curriculum and then transfer to Langara.

NICOLA VALLEY INSTITUTE OF TECHNOLOGY – No representative sent

NORTH ISLAND COLLEGE – Jeannie Cameron

NIC experienced a slight decrease in enrolment in Calculus I/II (MAT 181/182) this year. Finite Mathematics (MAT 151) had a large increase in enrolment, primarily the result of international students taking business programs. Enrollment in Logic and Foundations (MAT 122) is small but stable.

Starting in Fall 2019, NIC will offer Calculus III (MAT 210) once again and Calculus IV (MAT 214) in Winter 2020. Development of Calculus IV was funded by the Office of Global Engagement (IE), and they are also funding the delivery of both courses in the upcoming academic year. Both courses will consist of 3 hours lecture and 1.5 hours of tutorial.

Algebra-based Introductory Statistics (MAT 115/STA 115 Fall 2019) is continuing to offer a section as part of a full four-month Summer term because of the increase in international students.

First year Calculus is using WeBWorK for online math homework. Calculus labs use Geogebra. First year Statistics is going to use the OpenIntro Statistics text for Fall 2019.

NIC again took part in the BC Secondary School Math contest this spring with over twenty students participating from four high schools representing the Comox Valley and Campbell River.

NORTHERN LIGHTS COLLEGE – No representative sent

OKANAGAN COLLEGE – Stephen Brown

Some notable events and information about the Okanagan College department of Mathematics and Statistics are:

- We are a department of now 21 members after hiring another new faculty member this spring and we are spread over 4 campuses. Our Kelowna campus offers a full range of first and second year offerings with a full set of traditionally off-semester course offerings at the first year level (for example, Calculus I in the Winter semester, etc.). Vernon & Penticton both offer all first year offerings including all traditionally off-semester first year courses. Salmon Arm mainly offers the traditional first year offerings.
- We are very excited to announce that we have received approval to offer a new post-baccalaureate diploma in marketing and data analytics. Our first intake will be Fall 2019. This 2 year program includes 5 new courses in data science along with 3 courses in statistics that are not normally offered at OC (and other courses that we normally offer).
- We have had a substantial increase in international students over the past 2 years – while this has been challenging in some respects, we have had a number of exceptional students as well.
- We continue to host the Math Challengers event for the Okanagan Region. Satoshi Tomoda is the principle organizer.
- We continue to partner with UBCO for the BC High School Mathematics Contest and the Kangaroo Math contest.
- We have a few other outreach projects in mind that may come together over the next year or two.
- In addition to recruitment, we do a lot of retention activities. We have had success converting Biology and Chemistry majors into Biology and Chemistry majors with Mathematics minors. This certainly helps our second year numbers.
- Work is under way on designing a new History of Mathematics course for arts and science students.

QUEST UNIVERSITY – Asia Matthews

We are a non-standard Canadian 4-year undergraduate university. We offer one degree: a Bachelor of Arts and Sciences. In mathematics we offer foundation and concentration courses. We offer most of the “standard” concentration topics (calculus, differential equations, analysis, abstract algebra, etc.). Our Foundation courses are perhaps the most different from the first-year courses at more standard universities. For example, the course I designed and teach is called Mathematics Through Interesting Problems which is an overview of mathematical subtopics (e.g. graph theory, game theory, number theory) with a focus on mathematical thinking and mathematical communication. Every student at Quest is required to take one Foundation math course. We have 4 permanent faculty in mathematics, including one new hire in 2018, and visiting tutors/instructors (approx. 4 per year?) Our enrolment number changes are not statistically significant.

Questions from the committee:

Does Quest accept transfer students? Yes

Is enrollment at Quest competitive? Yes, I believe so.

ROYAL ROADS UNIVERSITY – No representative sent

SELKIRK COLLEGE – Doug Henderson

No new courses were added at the college this past year. Overall enrolment was down across the college, this showed up in math student numbers (typical drop of 5 - 10% from 17 - 18) The one exception to this was our Math 181 class (a problem solving class for non-science majors). The prerequisites were changed from Math 11 to Math 10, which allowed a large number of international students to enroll. This past year the enrolment increased from 10 in 2018 to 69 in 2019.

No new math or stats courses are being added for next year. There may be a second-year added to our engineering programme a few years down the road, which would mean re-introducing some previously suspended second-year courses (Calc III, ODEs).

SIMON FRASER UNIVERSITY – Justin Gray & Harsha Perera

THOMPSON RIVERS UNIVERSITY – Suzanne Feldberg

THOMPSON RIVERS UNIVERSITY (OPEN LEARNING) – Iain Pardoe

Enrolments:

Open Learning enrolments for our undergraduate math courses increased 31% in the last fiscal year (and 6% in the previous fiscal year). Total annual enrolments for the most recent fiscal year are nearly 2200. The majority of these (80%) are continuous enrolment web courses, while 13% represents our single paced online course (MATH 1901: Math for Teachers), and 7% are print courses.

We offer one statistics course (STAT 1201: Introduction to Probability and Statistics), for which enrolments increased 15% in the last fiscal year (and 10% in the previous fiscal year). Total annual enrolments for the most recent fiscal year are just over 700 (93% continuous enrolment web, 7% print).

Courses seeing the largest increases include Introduction to Probability and Statistics, Pre-calculus, Calculus I, Calculus II, and Math for Teachers.

New Math faculty:

Josh Sorge – MATH 1901: Math for Teachers.

New Math Courses:

MATH 1701: Discrete Mathematics. Students are introduced to the foundation of modern mathematics including basic set theory; counting; solutions to recurrence relations; logic and quantifiers;

properties of integers; mathematical induction; asymptotic notation; introduction of graphs and trees; finite state machines and formal languages; Boolean algebra.

Revised Math Courses:

MATH 1901: Math for Teachers. Updated to reflect new BC Curriculum for K-9, to add further learning resources including instructional videos and extra practice exams, and to offer an online proctored final exam option using ProctorU.

TRINITY WESTERN UNIVERSITY – No representative sent

UNIVERSITY OF BRITISH COLUMBIA - VANCOUVER – Wayne Nagata

There have been no changes in the past year that would affect articulation. In particular, our Business Calc 2 (MATH 105) still has approximately three weeks of infinite sequences and series (including Taylor series), so that it is equivalent within UBC-V to our Science & Engineering Calc 2 (MATH 101) as a prerequisite for 200-level MATH courses.

Open Educational Resources and Open Texts

Most First Year and Second Year courses in Math use open texts, and Webwork via Canvas for homework. In Differential Equations 1 (MATH 215/255), in addition for Webwork, students submit photos or scans of written homework solutions to Canvas, and also Matlab files. Several other courses also use Matlab, e.g. Linear Algebra 1, using the web-based version so students do not have to install the software on their own computer or obtain site licences.

Course outlines and course web pages are available at <http://www.math.ubc.ca/Ugrad/index.shtml>. Select a recent Session (e.g. 2018w) and look for a course. In most cases the web sites (W) are still live and you can see the textbook used, course outline, etc. In a few cases only a pdf file of the course outline (O) is available, but this usually has textbook information.

Multi-section courses have a designated “Instructor In Charge” who formulates the course outline, selects a textbook, is responsible for composing the common final exam, and usually maintains a common web site for the course.

UNIVERSITY OF BRITISH COLUMBIA - OKANAGAN – Wayne Broughton

In science-based Calculus I and II (MATH 100 and 101) we made quite a few changes this past year.

We have started moving toward an open source textbook and online homework system. The official text for the course was OpenStax Calculus, and Stewart’s text was also available as an eBook with the WebAssign online homework system. These texts were not used directly for the lectures, and were really just available as references and for problems in WebAssign assignments. In the future we will probably move toward the UBC Vancouver model of using the free WeBWorK system, to further reduce student costs.

We also drastically reduced the use of Maple in the associated computer labs, instead relying on websites like Desmos for graphical visualization in class and the labs. Some of our mathematics faculty still expect their upper-level students to have some background in Maple, but most said they were in favour of reducing or eliminating the use of Maple in first-year calculus and using the current lab time for either other software tools or tutorials instead.

To mitigate the increasing difficulty of detecting plagiarism on homework assignments and students’ increasing use of internet sources for solutions of homework problems, more emphasis in the course evaluation has been placed on the midterms and final exam. In addition, this past term students wrote quizzes based on homework assignments during their lab time, rather than handing in written assignments.

There were certainly hiccups and headaches trying to implement all these changes in one year, and things will continue to evolve as we go forward.

Bigger changes coming on the horizon include a likely restructuring of our entire B.Sc. degree to make it much more flexible, and in particular removing the hard requirement for MATH 101 for all B.Sc. students, so that individual departments can decide how much math is required for their programs.

UNIVERSITY CANADA WEST – No representative sent

UNIVERSITY OF THE FRASER VALLEY – Ian Affleck

We have a new full-time permanent hire in Statistics – Dr. Ruwan Karunanayaka (PhD. Stats, 2018, SFU).

In February 2019, our department hosted the first annual Fraser Valley Indigenous Math Education Sq'ep. ("Sq'ep" is a Sto:lo word which translates roughly to "gathering".) There were about 70 attendees, from local teachers to UFV faculty to students in our MFEE courses and our Teacher Education Program. Watch for announcements of the second annual Sq'ep, likely to run again as a one day event during the four-day workweek which includes Family Day.

In Fall 2018 our department was invited to run a section of MATH 105 (Math for the Elementary School Teacher) for about 20 students at Nuxalk College in Bella Coola. Stan Manu flew into Bella Coola for three very busy weekends, and found the experience very enriching and rewarding. Enrolments are reasonably stable, except for a possible downward trend in Science Calculus. Beginning this year we are offering two sections (72 seats) of our Life Sciences streams of Calculus I and II, rather than one section of each.

Our Data Analysis Post-Degree Certificate began a Co-op option this year, where students have access to Co-op summer positions in their third of four semesters. Enrollment in this program appears to be increasing significantly in response.

The Math & Stats Department has adopted WebWorK for Science Calculus (MATH 111 and 112), Science Precalculus (MATH 110), and Discrete Math (MATH 125). We anticipate that Stats and Business Math courses will follow suit in the next few years, and that this will facilitate adoption of open textbook resources for these courses.

UFV is collaborating with Rick Hansen Secondary in a pilot project this May-June to offer STAT 106 (Statistics I) and ENGL 105 (Academic Writing) to two cohorts of Grade 12 students, 24 students each, one cohort specializing in Business Studies and one in Science Studies.

UNIVERSITY OF NORTHERN BRITISH COLUMBIA – No representative sent

UNIVERSITY OF VICTORIA – Gary MacGillivray

We have no changes that affect articulation.

VANCOUVER COMMUNITY COLLEGE – Gabriela Kakushkin on behalf of Costa Karavas

Existing and new courses

The Mathematics Department in the School of Arts and Sciences offers Precalculus (MATH 1020) Calculus I (MATH 1100), Calculus II (MATH 1200), Calculus III (MATH 2251), Discrete Mathematics (MATH 1120), Applied Linear Algebra (MATH 1221) and Introduction to Statistics (MATH 1111).

New mathematics courses are: Ordinary Differential Equations (MATH 2310), Probability and Statistics for Science and Engineering (MATH 2700), Mathematics for Teachers (MATH 1190) and Mathematics for the Arts (MATH 1210).

Pathways to University

First-year certificate programs in Engineering, Computing Science, Software Systems, and Environmental Studies continue to be offered, providing VCC students the option to complete their 1st year courses at VCC and then transfer to SFU and UBC. These certificate programs have increased enrolment in the existing calculus courses.

New VCC programs are in effect in establishing pathways into 2nd year at SFU. Graduates of the VCC UTSC program, who are admitted into the SFU Faculty of Science, may be awarded up to 34 transfer credits to be applied toward the first year of a Bachelor's of Science Degree. Program options are available for the following nine Major areas of study within the Faculty of Science at SFU, Bachelor of Science in: Biological Sciences, Chemistry, Applied Mathematics, Mathematics, Molecular Biology and Biochemistry, Physics, Applied Physics, Biological Physics and Statistics.

Enrolment

Enrolment in the Calculus courses has moderately increased since last year as the certificate programs become popular with UT students.

Enrolment in our Statistics course (MATH 1111) experiences high enrolment as it serves as a core course for many Health Science programs and especially for the BSN (Bachelor of Nursing).

An Associate of Science degree, flexible pre-major in Biology and Associate of Arts degree have gone through the governance process and curriculum development of 2nd year courses have started.

Software

MAPLE and MATLAB software can be accessed remotely by VCC math students and instructors through virtual licenses. This has minimized computer lab dependency.

VANCOUVER ISLAND UNIVERSITY – Lev Idels

YORKVILLE UNIVERSITY – Iqtidar Ali Shah

Yorkville University is a pan-Canadian, private, non-denominational post-secondary institution offering practitioner-based diplomas, bachelor's and master's degree programs in Fredericton, N.B., Vancouver, and Toronto including the Toronto Film School. It began offering a Bachelor of Business Administration degree in BC in October 2016 and currently has 635 on-campus and on-line students from its location in downtown Vancouver. Yorkville became a member of the BC Transfer System last year and currently has 24 agreements with 3 institutions (SFU, Athabasca and Kwantlen) for 14 BBA courses. As part of its BBA degree, Yorkville offers course in Business Mathematics, Business Statistics and Developmental Mathematics.

YUKON COLLEGE – Jaclyn Semple

7. BUSINESS ARISING FROM THE 96TH MEETING

14:33

7.1 Calculus Core 5-year review. – Ian Affleck

A complication arose as the Calculus Core subcommittee reviewed institutions' feedback: some institutions offer only one business calculus course, not two, and it is difficult to compare feedback from institutions of these two types.

Please complete the survey on behalf of your institution (one response per institution) by May 31st; it is a long survey, so do not postpone. You should answer the questions from the perspective of what your institution currently does or is currently planning to do in the near future, whether or not you agree personally. For each topic you are asked to describe it as *core*, *additional*, or *omit*. Interpret a topic as *core* if you would expect a course that omits it to

undergo scrutiny before being articulated, as *additional* if it is a valuable addition that your institution uses to provide breadth, and as *omit* if it is an expendable topic whose inclusion. If your institution offers only one Calculus for Business and Social Science course, please leave blank any questions about second-semester topics.

7.2 High School Numeracy Assessment. – Ian Affleck

The committee reviewed the responses sent by the Ministry representative in response to our questions at the 96th meeting. One question the committee had about the Graduation Numeracy Assessment was what “The reliability of the GNA was greater than .8” meant, and the response received from the Ministry representative did not explain how this number was calculated. The *report from markers* includes interesting qualitative and aggregate feedback; it does not include information about how many students earned which overall score (from *emerging* to *extending*).

7.3 Other Business Arising.

There was none.

8. NEW HIGH SCHOOL GRADE 11 & 12 COURSES AS UNIVERSITY COURSE PREREQUISITES. – Ian Affleck

Representatives discussed the steps their institutions have taken to update prerequisites for their MATH and STAT courses given the new High School Grade 11 & 12 courses. Ian Affleck shared some details from UFV, and is happy to respond to inquiries from any representatives who are interested. Dan Henschell reported that Douglas College went through an exercise similar to UFV’s. Justin Gray reported that SFU too has evaluated all of the new courses for admission and prerequisite purposes, and will be monitoring the results of those new guidelines.

The Tuesday session of the BCcupms adjourned at 4:25 pm

(moved by Wayne Nagata and seconded by Suzanne Feldberg)

BCcupms Meeting with Public School Teachers

9. INTRODUCTION AND OPENING REMARKS.

16:32

The committee welcomed four teachers from Mount Baker Secondary School.

10. REPORTS

10.1 BCAMT—Deanna Brajcich (in absentia)

Ian Affleck shared notes that Deanna Brajcich, who was not able to be here, had collected. These were mostly concerned with feedback she had collected from teachers about support, or lack of support, with finding new learning resources for the new curriculum.

10.2 BC Secondary Schools Mathematics Contest—Suzanne Feldberg.

COTR has participated in this contest in the past, and they hope to resume it next year. Suzanne Feldberg summarized the results of the latest contest; please see page 32 for the full report.

10.3 Math Challengers—Leo Neufeld (in absentia).

Math Challengers is a competition for Grade 8, 9 and Grade 10 students who love math and excel in doing it.

This year just over 1000 students participated at the Regional level. Grade 8 teams came from 46 different schools, Grade 9, from 42 schools and Grade 10, from 36 schools. Students are also permitted to register as individual competitors. Top teams from each pool and Individuals then advance to the Provincial competition, which was held at UBCV this year. It's a really fun, rewarding and enriching day for all!

Math Challengers Regional Competition Registration									
Grade 8	Lower Mainland		Vancouver Island		Okanagan		Fraser Valley		Prince George
	2018	2019	2018	2019	2018	2019	2018	2019	
Schools	25	25	9	10	4	4	10	7	-
Teams	42	41	17	20	5	6	17	15	-
Competitors	210	205	80	100	25	30	85	75	-
Grade 9									
Schools	29	26	4	6	6	3	8	7	-
Teams	47	41	8	9	8	4	12	10	-
Competitors	235	205	35	45	40	20	60	50	-
Grade 10									
Schools	26	23	3	5	2	2	5	6	-
Teams	38	35	4	9	4	2	10	9	-
Competitors	190	175	20	45	20	10	50	45	-

The format of the event consists of solving math problems individually and in teams with the prospect of trophies, medals and prizes when it's over. Brief talks or other math-related activities are also part of the day. In the final stage, called Face-off, the top ten students compete one-on-one to see who first solves a problem. Parents, coaches and the other competitors thoroughly enjoy the excitement of this elimination round.

All this is possible because of dedicated volunteers and committed teacher coaches, as well as financial assistance from organizations like PIMS, BCHydro, IBM and EGBC. UBC, SFU, BCIT, Camosun College, Okanagan College, UFV and UNBC provide generous competition-site hosting support.

For the Regional competition, besides the main competition site on the Lower Mainland, we also have competitions on Vancouver Island, in the Okanagan, the Fraser Valley and Prince George. Organizers are Satoshi Tomoda (Okanagan), Ian Affleck (UFV) and Erin Beveridge (UNBC, unfortunately no registrants again this year). Colleges and universities are ideal sites for hosting MC. We'd love to see the MC opportunity expanded to include kids in the entire Province. The Kamloops and mid-Vancouver Island regions are prime candidates for becoming new start-ups.

For information about MC:

<https://www.egbc.ca/Math-Challengers/Math-Challengers-Home>

For previous competition problems:

<https://www.egbc.ca/getmedia/5cfa019a-f50b-4a12-97b0-e8ebf020ce71/Quest-Archive.pdf.aspx>

10.4 Calculus Challenge Exam run by UBC and SFU—Wayne Nagata.

In 2018, 66 wrote the exam and 63 passed. In 2017, 82 wrote, 34 passed, and 2 were caught cheating. Please see <https://www.sfu.ca/math/k-12/calculus-challenge-exam.html> for more information about this exam, including sample tests and statistics. This exam is a relatively cheap way to earn credit for university-level calculus; there is no risk, and students are not obligated to report their exam score.

Justin Gray added that in recent years only a few students have been reporting the exam for course credit. Although SFU has not tracked this, UBC reported that in 2013 only 5 students claimed credit, in 2014 only 9, in 2015 only 6, in 2016 only 6, and in 2017 only 1. They have also observed that many students who write the Challenge Exam are also writing the AP Calculus exam. Because of this, the SFU Undergraduate Studies Committee has recommended that resources put into running this exam could be better placed elsewhere. This will be discussed at an upcoming department meeting.

Wayne Nagata reported, however, that 31 of the 63 students who passed the exam in 2018 went on to claim credit at UBC, and that UBC will be hosting the exam in 2019. It is possible that students are claiming credit elsewhere; there are a few institutions that recognize this exam.

11. DISCUSSION ON UPCOMING (FALL 2019) FULL IMPLEMENTATION OF NEW CURRICULUM

The Committee was interested to hear about Mount Baker's approach to the new courses, particularly how they have searched for supporting materials. Mount Baker will be offering all of the new courses other than Geometry and History (because not enough students signed up for those two). They now develop their own materials for their courses, rather than buying textbooks, and prefer to develop their own materials from the ground up.

One teacher spoke in particular about assessment methods, and strategies they are using to try to ensure that students demonstrate understanding of *all* learning outcomes at a basic level in order to pass a course. In the past a student could pass by understanding several learning outcomes well while completely not understanding others. Bruce Dunham asked whether the teachers shared his impression that the new curriculum emphasizes sense-making and problem-solving, which he regards as very positive. Although the teachers agreed that these were useful and important skills, they did not see it as a focus of the new curriculum and were also concerned that students need stronger foundational skills before they are ready for problem-solving.

Also on the subject of assessment, the Committee and teachers discussed students' and teachers' perceptions of and attitude toward the Numeracy Assessment. The impression is that students

may be regarding it as a mandatory exercise. In addition, teachers do not get detailed enough feedback to use it as an intervention tool; they may know which students do not score well on the Numeracy Assessment, but not which specific skills they need help to develop.

12. **GENERAL DISCUSSION:** further topics to be suggested by the teachers.

Teachers were interested to know how post-secondary institutions perceive the Numeracy Assessment. There was a short conversation about the purpose of Foundations 12 from the post-secondary perspective.

13. **ADJOURNED TO RECEPTION AT 5:55PM**

(Moved by Natasha Davidson and seconded by Dan Henschell)

Wednesday, May 15, 2019

Plenary Session

14. **OPENING REMARKS** Two minor alterations to the agenda: removal of attendance lists from this short morning session (formerly item 14.3), addition of a new item to new business: 17.5 (Impact of course or department names on articulation). 9:00

(Moved by Ian Affleck Seconded by Suzanne Feldberg)

14.1 **Announcements from the host.**

14.2 **Introduction of representatives.**

Parallel Sessions

15. **MATHEMATICS SESSION**—Chair: Ian Affleck 9:20

M.15.1. **Attendance lists.**

M.15.2. **Report from the Calculus Readiness Test Subcommittee** — Justin Gray

The Calculus Readiness Test is an instrument developed by the subcommittee, and is intended to diagnose students' mastery of skills that are required for success in calculus. It can be used as a placement or challenge test, or simply as a diagnostic or advising tool, and it is up to each institution to decide how to use it. The test was designed to be a multiple-choice test, can be administered online or on paper, and is designed so that multiple versions of the test can be quickly generated. To develop the multiple choice options, it was first administered to a pool of undergraduates in free-response form, and the most popular incorrect answers were used to generate the distractors. This test has been used a few times, with the first full-scale deployment in Fall 2016. After Fall 2016, the subcommittee analyzed the test by using a tool developed by Richard Taylor (TRU) to consider how well the test predicted success in the calculus course grade. Based on that analysis, the subcommittee has adjusted the test content each year. The most recent version of the test is now only 15 questions long, and the recommended time limit of 30 minutes is considered to be generous.

Justin Gray showed the Committee the current version of the test, and some of the resulting analysis, all of which will be made available to the Committee. In response to questions about using this test as a placement tool, he pointed out that the available data is based on having administered the test to students who are registered for a first-semester calculus class. This means that the data is based on students who have met the pre-requisites for calculus, and so we should be cautious about extrapolating it to students who are challenging their lack of a pre-requisite. At SFU they have been using the test as an advisory tool, administered in the second day of class. No institution had yet used the test as a placement tool.

If you are interested in running the test at your institution, contact Justin Gray.

M.15.3. **Report from the Calculus Common Core Subcommittee** — Justin Gray

This was discussed yesterday (item 7.1). The subcommittee has nothing to report other than the creation of the survey; they will report on the results of this survey at the next meeting. Each institution should complete the survey once, and the responses should reflect the general consensus of the institution.

M.15.4. **Open Educational Resources and Open Texts.**

M.15.5. Software in Calculus and/or Linear Algebra Courses.

M.15.6. Engineering Common Core project - follow-up from Agenda item 5.2.3 if necessary. (See posted link at www.bccupms.ca).

There was no follow-up discussion.

15. STATISTICS SESSION—Chair: Bruce Dunham

9:30

S.15.1. Approval of agenda.

S.15.2. Approval of the minutes of the Statistics Subcommittee Session of the 96th meeting.

S.15.3. Matters arising from the minutes.

S.15.4. Institutional reports.

S.15.5. Statistics 12: Update on workshops and support for teachers. (Bruce Dunham, UBC).

S.15.6. Use of online, open access resources. (Bruce Dunham, UBC)

S.15.7. International Statistical Literacy Project poster competition. (Bruce Dunham, UBC)

S.15.8. Any other business.

S.15.9. Motion to adjourn.

Plenary Session

16. HIGHLIGHTS FROM THE PARALLEL SESSIONS (Details will appear in the minutes.)

11:30

The Stats subcommittee has elected Michael Lo as their official secretary. They have been working for a number of years on a document describing the core content of an introductory stats course, and are now ready to sign off on this document although they do still need to determine its status and clarify its purpose. It should be a useful guide for institutions developing a new course, and could inform articulation to an extent. They discussed recent developments in Data Science programs in B.C.. They discussed free online resources; in particular, merlot.org is a curated repository of available resources. At UBC they have integrated WeB-WorK with R; learn more at https://wiki.ubc.ca/Documentation:WeBWork/The_WeBWorkProject:_Integrating_WeBWork_with_R. Bruce Dunham put out a call for submissions of materials to statspace <https://statspace.elearning.ubc.ca>. At Camosun, the Department of Economics has developed into the Department of Economics, Statistics, & UT Business, which was a surprise to the Department of Mathematics and Statistics. This will be something to bear in mind with articulation requests, and there is a question of whether that department should be invited to send a representative to this committee.

The Math subcommittee heard from Justin Gray about the latest version of the Calculus Readiness Test; if you are interested in using the test at your institution then please contact Justin Gray for more information. Committee members shared information about open educational resources that their institutions have adopted, including textbooks, homework systems, and repositories.

17. NEW BUSINESS

13:28

17.1 Initiatives on Indigenization of Math/Stats programs and/or courses.

In February 2019 the UFV Math Department hosted the first annual Fraser Valley Indigenous Math Education Sq'ep. ("Sq'ep" is a Sto:lo word which translates roughly to "gathering".) Ian Affleck will send out an invitation to UFV's second annual Sq'ep.

Andrea Hyde mentioned the BC campus indigenization guides, each of which is focused for a specific audience. <https://bccampus.ca/projects/indigenization/indigenization-guides/> Iain Pardoe, at Thompson Rivers University Open Learning, took the opportunity of a course that was being redesigned anyway to incorporate some indigenous content and applications. Natasha Davidson, who has at invitation run workshops with teachers about indigenization, shared that her experience is that incorporating indigenous ways of knowing into your teaching methods is more important than adding indigenous-based examples. Incorporating those examples without also incorporating the teaching methods can end up being appropriative or simply lip-service.

Asia Matthews read the First Peoples Principles of Learning out-loud to the committee, and shared some ways she has connected each to her own teaching practice. Read the Principles, as well as detailed discussion and connections to other educational theory, at <https://firstpeoplesprinciplesoflearning.wordpress.com/>

17.2 Mathematics Flexible Pre-Major.

The Flexible Pre-Major reports from 2006, 2008, 2011, and 2016 are posted on the BCCUPMS page (the 2016 report is page 32-33 of the 2017 minutes).

Fiona McQuarrie added to that the BCCAT is concerned about how the Flexible Pre-Majors are communicated. Not only would BCCAT like a review of the content, they would like a review of the communication and utility. Does the FPM create a viable pathway that allows students to transfer at the third year?

Gary MacGillivray said that there is in fact no block transfer of credit; there are all course-to-course articulations.

Bruce Dunham asked whether BCCAT knew how many clicks the FPM document had gotten, because one reason that the Statistics Flexible Pre-Major was created was as publicity for statistics majors. Fiona McQuarrie reported that the number of clicks is extremely small.

The BCCAT would like consensus from the BCCUPMS by the end of December, 2019.

A subcommittee was formed to review the FPM: Gary MacGillivray (chair), Ian Affleck, Natasha Davidson, Andrea Hyde, Wayne Nagata, Mike Nyenhuis.

Action item: the subcommittee will report their findings to the Committee in time to reach consensus for the BCCAT by the end of December, 2019.

17.3 New High School Grade 11 & 12 courses as university course prerequisites

Ian Affleck reiterated his offer to make updated pre-requisite information available to Committee members upon request.

17.4 Student success - International and Domestic.

Patrick Montgomery started the discussion by reporting that the pressure points are still in pre-calculus, in terms of failure rates. They also continue to see cultural difficulties with understanding academic dishonesty.

Susan Oesterle shared that at Douglas there had been anecdotal reports that international students were struggling; when Institutional Analysis looked into the situation they found that the difference in academic achievement was in fact slight.

Ian Affleck shared a UFV prerequisite screening document, in which they analyzed student achievement in UFV courses based on each student's score in the pre-requisite course. Based

on this document, which was based on Fall 2010 - Fall 2016 data, UFV adjusted some of their pre-requisites.

Bruce Dunham reported that stats programs at UBC have the highest proportion of international students within the faculty of science. He drew the Committee's attention to a research paper published in the Journal of Statistical Education about difficulties ELL students experience in learning statistics: <https://www.tandfonline.com/doi/full/10.1080/10691898.2018.1511388>.

The committee also discussed the importance of mathematics and statistics students developing writing skills, not only for international or ELL students. Gary MacGillivray mentioned a study from some years ago at UVic that determined that high school English class grades were better predictors of success than were high school Math class grades (Lorraine Dame, 2012, *Student readiness, engagement and success in entry level undergraduate mathematics courses*). The BCCAT will be publishing a report about English language proficiencies for admissions in the near future.

17.5 **Impact of course or department names on articulation** – Patrick Montgomery

A recent department name change took place at Camosun, and the committee discussed how this would relate to articulation requests. This related to past Committee discussions regarding instructor qualifications; when course is articulated, participating institutions have historically trusted one-another to assign instructors appropriately.

18. COMMITTEE BUSINESS

15:20

18.1 **BCcupms: Webmaster's Report** – Ian Affleck.

The Webmaster reported his intent to revise the website structure, by archiving some pages that have become outdated and adding new resources. In particular:

The page for the MFEE Subcommittee will be removed, but the reports from that page will first be moved to the Projects & Reports.

The LON-CAPA information page will be removed.

The Math Contests link will be redirected to go directly to the page that Suzanne Feldberg maintains. The WNCIP Information link under General Interest can be archived now and a new link made to the updated K-12 math curriculum.

It was suggested that in addition to these changes, the Webmaster add a page of resources for High School teachers.

Please review the Members page and send any corrections directly to the Webmaster.

18.2 **Report from the Nominating Committee; elections for the Vice-chair and Secretary of the BCcupms if necessary.**

The nominating committee reported that: Suzanne Feldberg accepted the nomination for Vice-chair of the BCcupms and Patrick Montgomery accepted the nomination for Secretary of the BCcupms.

Call for nominations: three calls for each, and nominations were accepted as recorded above.

18.3 **Proposed agenda items for our 98th meeting.** Students use many resources in addition to what their instructors provide, from crowd-sourcing websites to wolfram alpha and youtube videos. How are institutions adapting to this, what resources (both ethical and unethical) are students accessing, and how does it affect the resources we provide? (Proposer: Jutstin Gray)

How have institutions been incorporating indigenous ways of knowing into our math and stats courses? (Proposer: Asia Matthews)

18.4 Date and location of the 98th meeting of the BCcupms:

May 12–14, 2020 at Trinity Western University.

18.5 Proposed future dates for BCcupms meetings:

Year	Meeting Dates	Location
2020	May 12–14	Trinity Western University (later updated to Douglas College)
2021	May 18–20	Camosun College
2022	May 17–19	Possible Joint AB–BC Meeting
2023	May 16–18	Somewhere in BC Interior?

Susan Oesterle pointed out that 2022 will be the 100th meeting of the BCCUPMS.

18.6 List updates:

Please look at our web page

<http://www.bccupms.ca/>

and check that contact information, email, telephone, fax, and address are up-to-date. Please send any corrections to our Webmaster, [Ian Affleck](#).

19. ADJOURNMENT

The meeting adjourned at 3:45pm.

(moved by Andrea Hyde and seconded by Suzanne Feldberg)

Many thanks to Andrea Hyde and College of the Rockies for their excellent work in hosting us for this meeting.

List of Committee members Present

Plenary Session TUE (a.m./p.m.); Secondary Teachers Session (Teach); Plenary Session WED (a.m./p.m.);
Concurrent Math/Stat

Name	Affiliation	TUE	Teach	WED	MATH	STAT
Ian Affleck (Chair)	UFV	x	x	x	x	
Mahshid Atapour	Capilano University	p.m.	x	x		x
Eugene Belchev	Langara	x	x		x	
Gera Belchev	Coquitlam College	x	x	x	x	
Deanna Brajcich	BCAMT					
Wayne Broughton	UBC, Okanagan campus	x	x	x	x	
Stephen Brown	Okanagan College	x	x		x	
Jane Butterfield (Secretary)	UVic	x	x	x	x	
Jeannie Cameron	North Island College	x	x	x		x
Ana Culibrk	Columbia College	x		x	x	
Natasha Davidson	Douglas College	x	x	x	x	
Bruce Dunham (Stats Chair)	UBC Vancouver	x	x	x		x
Suzanne Feldberg (Vice-Chair)	Thompson Rivers University	x	x	x	x	
Justin Gray	Simon Fraser University	x	x	x	x	
Doug Henderson	Selkirk College	x	x	x	x	
Dan Henschell	Douglas College	x	x	x		x
Claude Hurtubise	Okanagan College	x	x			x
Andrea Hyde	College of the Rockies	x	x	x		x
Lev Idels	Vancouver Island University					
Simin Jolfaee	BCIT	x	x	x		x
Gabriela Kakushkin	VCC	x	x	x	x	
Costa Karavas	Vancouver Community College					
Susan Kinniburgh	Camosun College	x	x	x		x
David Leeming	PIMS	x		x	x	
Michael Lo	Langara College	x	x	x		x
Gary MacGillivray	University of Victoria	x		x	x	
Asia Matthews	Quest University	x	x	x	x	
Fiona McQuarrie	BCCAT	x		x	x	
Sandra Merchant	BCIT	x	x			
Patrick Montgomery	Camosun College	x	x	x	x	
Wayne Nagata	UBC Vancouver	x	x	x	x	
Michael Nyenhuis	Kwantlen Polytechnical University	x	x	x	x	
Susan Oesterle	Douglas College (SLP)	x	x	x	x	
Paul Ottaway	Capilano University	x	x		x	
Iain Pardoe	Thompson Rivers University Open Learning	x		x		x
Harsha Perera	Simon Fraser University					
Shane Rollans	Thompson Rivers University	x	x	x		x

Continued on next page...

List of Committee members Present, cont.

Plenary Session TUE (a.m./p.m.); Secondary Teachers Session (Teach); Plenary Session WED (a.m./p.m.);
 Concurrent Math/Stat

Name	Affiliation	TUE	Teach	WED	MATH	STAT
Jaclyn Semple	Yukon College	x	x	x	x	
Iqtidar Ali Shah	Yorkville University, BC Campus	x	x	x		x
mandev singh	Yorkville University	x	x	x	x	
Krishna Subedi	Alexander College	x	x	x	x	
Ben Tippett	College of the Rockies	x	x	x	x	
Tracy Wall	College of New Caledonia	x	x	x	x	
Erfan Zahrai	Coast Mountain College	x	x	x	x	

Supplemental Reports

PIMS Report

DRAFT

BC Secondary School Mathematics Contest, 2019

On May 3, 2019 the Final Round of the BC Secondary School Mathematics Contest was written at nine provincial colleges and universities. Students who had performed well on an earlier Preliminary Round held within their own high schools were invited (together with a teacher sponsor) to attend the Final Round and spend a day at the local post- secondary institution with several activities involved.

Reporting institutions are:

Capilano University	(CapU)
Coast Mountain College	(CMTN)
Douglas College	(Douglas)
Langara College	(Lang)
North Island College	(NIC)
Okanagan College/UBC Okanagan	(OC/UBCO)
Thompson Rivers University	(TRU)
Vancouver Island University	(VIU)
University of the Fraser Valley	(UFV)

The table below gives a summary of the number of students and the top scores (out of a possible 100) on the Final Round at each institution that reported the Final Round.

Institution	Final Round		Top Three Scores		Averages	
	Juniors	Seniors	Junior	Senior	Junior	Senior
CapU	23	20	100, 99, 98	100,100,100	70.5	72.1
CMTN	10	6	90, 50, 43	53, 43, 38	33.0	34.3
Douglas	17	22	95, 93, 89	100, 90, 88	66.6	64.9
Langara	33	4	100, 100, 100	100, 98, 97	56.4	93.5
NIC						
OC/UBCO	17*	32	73,68,67	101,100,86	51.5	52.9
	43		86,70,69		42.9	
TRU	29	26	77, 73, 66	86, 76, 63	38.4	46.0
VIU	45	38	83, 82, 78	94, 80, 77	46.5	47.8
UFV	46	46	100, 89, 83	83, 68, 65	47.3	41.0
TOTAL	263	194				

*OC/UBCO separate the grade 8s from the 9s and 10s for the junior contest.

The top reported Junior and Senior Preliminary scores were both 60 out of 60, with averages between 22 and 33, slightly higher than 2018. Five schools reported a total of 1970 junior and 930 senior participants in the preliminary round (an increase of about 350 students for the same 5 schools last year). It is noteworthy that 66% of these students were reported by VIU. Not all schools report Preliminary Round scores or participation numbers, so there is no way to know exactly how many students actually participate. A total of 457 students, from the eight institutions reporting, participated in the Final Round this year. The number of students writing the final round was approximately the same as last year.

This report will be posted on the BCSSMC web site:

http://mathcontest.sites.tru.ca/files/2016/06/MathContestBCCUPMReport_2019.pdf

For those planning for next year, the dates we are suggesting for the 2020 contest are:

Preliminary Round: Near April 1, 2020

Final Round: May 1, 2020

Due to the variable timings and lengths of spring breaks we suggest that we be flexible with when schools write the preliminary.

We are still working on improving the process of putting the contests papers together. All help is welcomed whether in the form of suggested problems, feedback, solutions and TeX typesetting! Please contact Suzanne Feldberg sfeldberg@tru.ca if you are interested.

The Math Contest website is <http://mathcontest.sites.tru.ca/>. On it you will find the most recent provincial summaries, and previous contest papers dating back to 1999.

The top students in at the Junior and Senior levels at each centre are given below. Note that participants were asked to submit a Freedom of Information Protection of Privacy Consent form in order for their names to be reported. In the following, only the names of participants who submitted a form are included, though school and grade are sometimes provided.

Capilano University

	Name	School	Grade
First Place Senior	Jack Liu	Moscrop Secondary	11
Second Place Senior	Felicity Xu	Burnaby South Secondary	12
Third Place Senior	Boya Yang	Burnaby South Secondary	11
	Name	School	Grade
First Place Junior	Anna Rojrattanachai	Moscrop Secondary	10
Second Place Junior	Harry Jiang	Ecole Alpha Secondary	10
Third Place Junior	Anna Li	Moscrop Secondary	9

Coast Mountain College

	Name	School	Grade
First Place Senior		Smithers Secondary	12
Second Place Senior		Charles Hays Secondary	12
Third Place Senior		Smithers Secondary	12
	Name	School	Grade
First Place Junior		Smithers Secondary	10
Second Place Junior		Charles Hays Secondary	10
Third Place Junior		Prince Rupert Middle School	8

Douglas College

	Name	School	Grade
First Place Senior	Rian Popat	Burnaby Mountain	11
Second Place Senior	Alex Cheng	Pinetree Secondary	12
Third Place Senior	Sophie Zhao	Pinetree Secondary	12
	Name	School	Grade
First Place Junior	Eric Zhou	Burnaby Mountain	9
Second Place Junior	Kevin Zhou	Pinetree Secondary	10
Third Place Junior	Michael Yu	Pinetree Secondary	10

Langara

	Name	School	Grade
First Place Senior	Warren Bei	Olympic Education Center	5
Second Place Senior	Kaixin Wang	Olympic Education Center	8
Third Place Senior	George Huang	Olympic Education Center	11
	Name	School	Grade
First Place Junior	Derek Li	Olympic Education Center	6
Second Place Junior	Kevin Liu	Olympic Education Center	7
Third Place Junior	Kiran Sun	Olympic Education Center	7

North Island College

	Name	School	Grade
First Place Senior			
Second Place Senior			
Third Place Senior			
	Name	School	Grade
First Place Junior			
Second Place Junior			
Third Place Junior			

Okanagan College/UBC Okanagan

	Name	School	Grade
First Place Senior	Mario Marcus Losada	Okanagan Mission Secondary	11
Second Place Senior	Zijun Meng	Okanagan Mission Secondary	11
Third Place Senior	Jordan Colledge	Kelowna Secondary School	12
	Name	School	Grade
First Place Junior	Samantha Yudin	Okanagan Mission Secondary	9
Second Place Junior	Jessica Bader	Clarence Fulton Secondary School	9
Third Place Junior	Jiheon Choi	Salmon Arm Jackson	9
	Name	School	Grade
First Place Grade 8	Mauricio Deschamps	KVR Middle School	8
Second Place Grade 8	Marcus Francisco	Skaha Lake Middle	8
Third Place Grade 8	Olivia Han	Skaha Lake Middle	8

Thompson Rivers University

	Name	School	Grade
First Place Senior	Frank Zhou	NorKam Secondary	11
Second Place Senior	Chu Duc Thang	Sa-Hali Secondary	12
Third Place Senior	Brayden Turner	Kamloops School of the Arts	12
Third Place Senior	Eleonora Agostinelli	NorKam Secondary	12
	Name	School	Grade
First Place Junior	Paige Hembling	Sa-Hali Secondary	9
Second Place Junior	Jodh Singh Nahjal	Sa-Hali Secondary	9
Third Place Junior	Patrick Gu	Sa-Hali Secondary	8

University of the Fraser Valley

	Name	School	Grade
First Place Senior	Yuchen Hua	Walnut Grove Secondary	11
Second Place Senior	Zuomiao Hu	Highroad	12
Third Place Senior	Binseong Kim	Chilliwack	11
Fourth Place Senior	Jack Ahn	Highroad Academy	11
Fifth Place Senior	Amy Penney	Maple Ridge Secondary	11
Sixth Place Senior	Justin Nickel	MEI	12
Seventh Place Senior	Nguyen Tuan Thanh	Walnut Grove	11
	Name	School	Grade
First Place Junior	Olivia Yang	Walnut Grove Secondary	10
Second Place Junior	Jovan Fang	Walnut Grove Secondary	9
Third Place Junior	Tom Yi	MEI	9
Fourth Place Junior	Jaehah Shin	Yale	9
Fifth Place Junior	Sharon Kung	Highroad Academy	10
Sixth Place Junior	Kevin Jiao	Walnut Grove	10
Seventh Place Junior	Junjie He	Langley Fundamental	10

Vancouver Island University

	Name	School	Grade
First Place Senior	Mingjie Zhao	Dover Bay Secondary	12
Second Place Senior	Zhenmin He	Dover Bay Secondary	12
Third Place Senior	Freyja Wang	Nanaimo District Secondary	11
	Name	School	Grade
First Place Junior	Sebastian Magana	Kwalikum Secondary	10
Second Place Junior	Barry Su	Ballenas Secondary	10
Third Place Junior	Wesley Zhao	Dover Bay Secondary	10

Report prepared on May 10, 2019 by

Shane Rollans
Department of Mathematics and Statistics
Thompson Rivers University

This report will be updated as additional schools submit results.

Minutes of the Statistics Subcommittee

at 97th BCCUPMS meeting
May 15, 2019

Venue: College of the Rockies, S105

Time: 9:20 am to 12:00 pm (with 10-minute refreshment break)

Present: Iqtider Ali Shak (Yorkville University), Mahshid Atapour (Capilano University), Jeannie Cameron (NIC), Bruce Dunham (Chair, UBC-V), Dan Henschell (Douglas College), Claude Hurtubise (Okanagan College), Andrea Hyde (COTR), Simin Jolfaee (BCIT), Susan Kinniburgh (Camosun College), Michael Lo (Secretary, Langara College), Iain Pardoe (TRU-OL), and Shane Rollins (TRU).

Apologies for absence: Harsha Perera

1. Approval of agenda

The approval of agenda was moved by Shane Rollins and seconded by Mahshid Atapour.

2. Approval of minutes from Statistics subcommittee meeting from 96th meeting

The approval of minutes was moved by Susan Kinniburgh and seconded by Dan Henschell.

3. Matters arising from the minutes

- The BC-wide Minitab licensing was brought up for further discussion. If the approximately \$4,000 cost is split among different institutions, there are problems both in terms of administration and fairness. The Chair had attempted to find clarification from BCNet regarding how the licensing arrangement would work, without total success. The Chair voiced an opinion that statistical education is moving away from commercial software and towards open source cloud-based resources, which have some obvious advantages over Minitab.
- Following previous discussions on the proposal for the content of a generic introductory course put forward by Julie Peschke (Athabasca), clarification was sought regarding the importance of the P-value in hypothesis testing. There was general agreement that at least some discussion of P-values was essential in an introductory course. Julie had also posed the question as to whether anyone knew of any open source textbook that presented hypothesis testing using only the critical value approach. No-one present was aware of such a resource.

4. Institutional Reports

British Columbia Institute of Technology

The Department of Mathematics at BCIT teaches about 25 statistics courses, most of which are introductory statistics. The computing program recently added introductory statistics to their required courses, and our department has been developing and teaching introductory statistics courses with a computing/IT flavor for such students. The part-time studies statistics courses (MATH 1060 and 3060), taught in the Applied Data Analytics Certificate program, are quite popular. There has been much growth in part-time studies courses since launching, partly driven by international students. The department uses mostly R, and occasionally Excel or Minitab.

Camosun College

There are no curriculum changes to Camosun's university transferrable courses. Some enrolment changes to note: an additional section of STAT 219 (Probability and Statistics 2) was offered but it was not sustainable and the course will revert to back one section per year; additional sections of STAT 254 (for engineering) will be offered next year. Summer offerings have been particularly

popular. The department continues to use OpenIntro in STAT 116, MyOpenMath and WeBWorK for online homework, and labs using Excel with MegaStat and R.

College of the Rockies

The college has offered around six sections of STAT 106 (Intro stats for business) and one per year of STAT 206 (calculus based).

There have been ongoing efforts to make changes to the stat labs. Excel is used now which works well for our business students who make up a significant portion of the enrollment. Biology requires R and collaboration is ongoing to develop labs in R so that those students can use the STAT 106 course for transfer to their program. Lyryx has been adopted for homework and the associated OpenStax Business Statistics text book. Students seem to like, but not love, the system and the text.

Langara College

The year has seen one retirement and one resignation, three new hires and a couple of emergency hires. The new program Post-Degree Diploma in Data Analytics was launched in January 2019. There are two intakes a year (January and September). It has a cap of 30 students and is running in cohorts. A co-op option is in the works. Students are predominantly international students.

A new program (Post-Degree Certificate in Data Analytics) is in the works. It is funded by the Ministry of Advance Education, Skills and Training and for exclusively domestic students.

There are six new courses in the Data Analytics program and one new introductory statistics for the Kinesiology major.

Currently, StatGraphics is adopted, which students can download on a PC. SAS (Enterprise Guide, SAS Studio and version 9.4) and R (only R-Studio, under the Anaconda package, which includes Python) are installed successfully on the network. There are plans to use R in some of the introductory statistics courses.

North Island College

North Island College has one statistics course: MAT 115 Introduction to Statistics. MAT 115 is an algebra-based course which serves life science, business, and criminology students with a minimum Foundations of Math 11 prerequisite. There are approximately four sections per year of MAT 115 with three at the Courtenay campus and one ITV (interactive TV) section between the Campbell River and Port Alberni campuses as well as a distance option offered in the Fall and Winter terms. An increase in international students continues to support an additional section at the Courtenay campus in Summer 2019. Students use free online statistics software applets to perform statistical analysis. There is no lab attached to the course. The textbook will change to the OpenIntro Stats in Fall 2019.

As of Fall 2019, MAT 115 becomes STA 115.

Simon Fraser University

There have been a number of changes over the past few years as the department tries to move towards data science and an increased focus on computation. Efforts are being made to grow our minor and major enrolments. Also, an undergraduate interdisciplinary major program in Data Science was introduced. It is a joint Statistics/Actuarial Science, Math, Comp Sci, and Business program and replaces the previous Management and Systems Science.

There are a couple of new lower division items since last year. Reproduced below are summaries of the major and minor statistics requirements at the lower division level and descriptions of the contrast between the major and minor programs.

Current lower division major requirements: 2 CPSC; Calc 1, 2, 3; Linear Algebra; STAT 180 (1

credit); STAT 240, 260, 261, 270, 285.

1) STAT 180 is “Career Development Seminar for Statistics and Actuarial Science”.

2) STAT 240 is “Introduction to Data Science”.

3) STAT 260/261 is “Introduction to R”

3) STAT 270/285 traditional Math Stat introductory courses; no significant recent changes.

Current lower division minor requirements: Calc 1, one of Calc 2 or Linear Algebra; one of STAT 201, 203, 205 (all non-calc), 270 (calc), or Business Statistics (BUEC 232), STAT 260/261

Upper division: creation of courses with multiple entry routes (these courses are shared between minor and major students)

1) Statistical Learning and Prediction (STAT 452), Time Series (STAT 485), Discrete Data (STAT 475), Applied Multivariate Analysis (STAT 445). All are cross-listed with 6XX graduate courses for students in outside disciplines.

2) All have prerequisite structures which permit students to by-pass theory and use noncalculus based courses (one of STAT 201/203/205/BUEC 232 plus one of STAT 302/305/BUEC 333 – none of these courses count toward the major program requirements).

Enrollments: The department has decided to try to grow enrollments by adding sections of heavily subscribed courses. Therefore, extra sections for STAT 100, 302, and 305 have been offered.

Thompson Rivers University

The proposed Masters of Science in Data Science has gone through DQAB and is awaiting final approval. Three statisticians have been added to the department over the past three years: Dr. Xiaoping Shi, Dr. Mateen Shaikh, and Dr. Javed Tomal, the latter two specifically to support the Data Science degree.

No new STAT courses have been added. Work is in progress converting the Mathematical Sciences degree to a Data Science degree in conjunction with the Computing Science Department.

The numbers in all statistics courses remain stable, including the section for Tourism students which has still not seen a decrease despite being replaced in their program a couple of years ago. Tourism has not revisited that decision even though their students seem to gravitate towards our offering rather than that of Geography. Hopes remain the decision will be reversed.

University of British Columbia, Vancouver

Demand for courses and programs in statistics continues to increase at UBC. Over 500 undergraduate students are taking a specialisation involving statistics, with around a further sixty enrolled on the minor. In addition, close to 100 students have applied this year to major in statistics as “late entrants”, hoping to enter the major at second year level or higher.

The department offered a new data science course at first year level, DSCI 100: Introduction to Data Science. The course has a pre-requisite of any Mathematics 12 course. Featured topics include data wrangling, visualisation, classification methods, clustering, and regression. There is no credit exclusion with existing STAT courses. The course attracted around sixty students in its trial run. The plan is to expand the course in response to an increase in demand for data science skills across the university.

The Flexible Learning project, funded by UBC’s Teaching and Learning Enhancement fund and the SSC, has continued developing and testing resources for introductory courses. All resources created are open-source and freely available via a new website, StatSpace. Educators are welcome to explore and register for StatSpace at statspace.elearning.ubc.ca.

Two new faculty members are to join the department this year. Benjamin Bloem-Reddy will join as an assistant professor having previously been at Oxford. Keegan Korthauer will also arrive

in a joint position with BC Children's Hospital Research Institute, having most recently worked at Harvard. Two long-standing members of the department, Rollin Brant and John Petkau, are retiring.

Further details on any of the above can be obtained by either visiting www.stat.ubc.ca or contacting Prof. Bruce Dunham at b.dunham@stat.ubc.ca.

Vancouver Community College

The Mathematics Department in the School of Arts and Sciences offers multiple sections of Introduction to Statistics (MATH 1111) within the academic year.

A new statistics (calculus-based) course, MATH 2700 - Probability and Statistics for Science and Engineering, has been introduced which will complement the Associate of Science degree (in progress). This course will also be open for transfer credit to UT students. The new course has been developed and currently been revised to include Calculus II as a prerequisite rather than a co-requisite.

Enrolment in the Statistics course (MATH 1111) experiences high enrolment as it serves as a core course for many Health Science programs and especially for the BSN (Bachelor of Nursing).

The course is also offered in an online format using MOODLE/MyMathLab pairing as of 2018.

Software: MS Excel is the software currently used for MATH 1111.

5. Statistics 12

The new Statistics 12 high school course will roll out in the province in the next academic year. The Chair has run various workshops for teachers, such as a one-day workshop in Burnaby in February. Further professional development opportunities for teachers are planned, including a session at the BCAMT annual conference October.

The new course is different from most traditional introductory courses (including, for example, AP Statistics) in that there is an emphasis on statistical thinking, including the evaluation and conducting of research studies, simulation-based inference, and the communication of statistical ideas. Members of the subcommittee were encouraged to reach out to their local high schools to offer support to any teachers who may be planning on teaching the new course.

6. Use of online, open access resources

Following previous discussions of open access resources, there was a brief review of free online materials for teaching statistics that those present were aware of. Notable mentions went to resources located at merlot.org, the online homework system WeBWorK, and UBC's new platform StatSpace. The Chair encouraged those in attendance to register for StatSpace and promote it to their colleagues.

Other freely available resources had been mentioned during institutional reports, including OpenIntro Statistics (which has an editable LaTeX version available), Lyryx (and the associated OpenStax statistics text book), MyOpenMath, and R (including R Studio).

7. International Statistical Literacy Project Poster Competition

Interest in the previous ISLP competition from within the province had been minimal, even though a new category had been created to encompass undergraduate student entries. The competition runs every two years, and submissions for the next competition will begin in January 2021. All are encouraged to keep the poster competition in mind, particularly for courses involving student projects.

8. Election of Secretary

Andrea Hyde nominated Michael Lo as the secretary of the subcommittee, seconded by Shane

Rollins. Michael accepted the nomination and will be the statistics subcommittee secretary for one term of two years by acclamation.

9. Any other business

An unusual situation has arisen at Camosun where The Department of Economics has recently renamed to become The Department of Economics, Statistics, and UT Business. This is odd, since the institution also has a Mathematics and Statistics Department. Moreover, from what can be gleaned from their website, no faculty in The Department of Economics, Statistics, and UT Business has any formal qualification in statistics. While the move is somewhat flattering, the subcommittee did express severe reservations about departments without appropriate faculty incorporating ?statistics? into their name. The lack of consultation at Camosun over the name change casts some doubt over the inner workings of the institution and raises questions concerning academic credibility.

10. Motion to Adjourn

Dan Henschell moved to adjourn, seconded by Iqtinder Ali Shak.