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

MINUTES OF THE 95TH MEETING, MAY 16TH - 17TH, 2017

University of Calgary

Tuesday, May 16, 2017

Plenary Session

1. **WELCOME**
   Robert Woodrow, Vice Chair, ACAT Mathematics and Statistical Sciences Articulation Committee. Department Head for Mathematics, Pure Mathematics at University of Calgary, welcomed the BCcupms to its 95th meeting at University of Calgary.

2. **ADOPTION OF THE AGENDA FOR THE 95TH MEETING OF THE BCCUPMS**

   Motion: (moved by Natasha Davidson and seconded by Deanna Baxter)

   That the Agenda for the 95th Meeting be approved without changes.

   Approved by consensus

3. **ACAT MATHEMATICS AND STATISTICS ARTICULATION COMMITTEE: APPROVAL OF THE MINUTES OF THE LAST MEETING.**

   No minutes to approve

   BCCUPMS: APPROVAL OF THE MINUTES OF THE 94RD MEETING HELD AT COLUMBIA COLLEGE.

   Motion: (moved by Doug Henderson and seconded by Leo Neufeld)

   That the Minutes of the 94rd be approved as written.

   Approved by consensus

4. **ANNOUNCEMENTS:**

   4.1 **Announcements from the host:** Jim Bailey provided information on internet access and logistics for the meeting. Robert Woodrow provided information about lunch options on campus and thanked Lyryx for providing the breakfast this morning.

   4.2 **Introduction of representatives.**

   4.3 **Attendance lists:** Deanna Baxter 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. Costa Karavas, David Leeming, Susan Oesterle, and Susan Chen volunteered to form the nominating committee.

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

PIMS Changing the Culture May 19th, 2017 (Justin Gray)

Canadian Mathematics Education Study Group, June 2 - 6, 2017 (Susan Oesterle)

5. **Reports**:

5.1 **Ministries of Education:** David McNeilly (AB), and Deanna Brajcich (BCAMT).

Deanna Brajcich introduced BCAMT and its purpose/affiliations, including regional meetings, teacher grants, listserv, newsletter, *Vector* magazine, Ivan L. Johnson Memorial Award, Book Club.

5.1.1 BC Ministry website:
http://www.bced.gov.bc.ca/irp/transforming_curriculum.php
Deanna Brajcich shared a slideshow presentation with an update on the Grade 10 - 12 math curriculum. Spring revisions will be available on BCAMT website shortly. Continuing to align 'Big Ideas' and 'Curricular Competencies'.
On the website, can see 'before' and 'after' descriptions of courses.
They are particularly in need of feedback on the Geometry, Computer Science, and History of Mathematics courses. They would also appreciate feedback from a BCCUPMS representative.

Questions for the BC Ministry

- (Deanna Baxter) Has the ministry ever looked at when students leave secondary school and go on to post-secondary, how do they do? We've had a big curriculum change with a focus on problem-solving at the elementary level, for example: has anyone looked to see whether these K-12 changes improve post-secondary results for the students involved?
  (Deanna Brajcich commented that the Ministry does look at studies from other places, but she doesn't know whether they've conducted any of their own. Jim Bailey commented that one problem is that it is unclear which Ministry would be responsible.)
  (David McNeilly replied that at the University of Alberta they did a study comparing the students' diploma exam marks as correlated with first term calculus marks and saw no correlation. John FitzGibbon commented that the *English* exam has been studied in that way and it does seem to correlate.)
- (Susan Chen) What is the expectation of offering the different branches of Math 12? A single school cannot possibly offer all eight of them.
  (Deanna Bracich commented that this is a question, and all she knows is that some schools are considering online offerings.)
- (Susan Chen) How will we as post-secondary institutions use the new courses for admissions?
- (Bruce Dunham) We have already sent in some comments about the Statistics curriculum, but will reiterate them here. We have a perception that teachers think the Statistics course will not be popular, which we think is very incorrect. We think that the teachers need help to teach this course, and we would like to help.
  (In response, Deanna Brajchic commented that support to teachers will fall on the BCAMT, and they would appreciate it. October, in Vancouver, is the next BCAMT annual conference followed by one in Whistler in 2018. There was in the past an idea of putting together a ProD day on statistics for high school teachers. Bruce Dunham emphasized that he would like to be invited into the space, rather than inviting himself.)
- (John FitzGibbon) Final curriculum is coming out too late for post-secondary institutions to use as reference when determining prerequisites and admissions. Registrars are already getting calls from Grade

10 parents asking what their children should take next year in order to prepare for college and university admissions. We have suggested they implement Grade 10 first and then 11 and 12 subsequently in order to mitigate this problem.

- (Erfan Zahrai) What topics are in the common numeracy assessment?
  Deanna Brajcich says it is only through Grade 10 content.
- (Roberto Bencivenga) Has there been any attempt to solicit input from the students?
- (Rick Sutcliffe) Admissions involves: admission to the institution, to the faculty, and a program. A given course might satisfy the institution admission but not a program, for instance. Different people at the institution would be involved in determining course requirements for each.
- (Susan Chen) We have students coming to us with Calculus 12 who never did Precalculus 12, which means they are unable to take Calculus 1 from us. This is more of a comment on the lack of a prerequisite structure within the secondary system, which might be more extreme under the new curriculum.

5.1.2 Comparison of the curricula in the two provinces. **Discussed in 5.1.3**

5.1.3 Will Alberta still be using the WNCP? Could we be finding a disparity of abilities between students from AB and BC?
David McNeilly reports: Alberta has initiated a comprehensive review of K-12, started this year and expected to go through 2022. They've identified core competencies, and are using these across all subjects in order to redevelop courses under a common framework. David McNeilly and Alex Ondrus participated for post-secondary representation. Not currently anticipating significant content changes, just organizational. Still early in the process; for the time being Alberta will be staying with essentially the WNCP.

5.1.4 Grades and reporting. **Not discussed**

5.1.5 Dual credit. Problems to be addressed: curriculum, instructor qualifications. **Not discussed**

5.2 **ACAT/BCCAT:** Clare Ard (ACAT); John FitzGibbon (BCCAT)

ACAT (Clare Ard): Described the New Alberta Learner Pathways System (LPS) and tools for it. Information from this presentation is available on the BCCUMPS website http://www.bccupms.ca/Documents/Meeting_Documents/Meeting_95_UCal/ACAT%20new%20website%20and%20LPS%20tools.pptx. She invites Articulation members to give her feedback about what should be on the new website, and to think about what the ACAT Mathematics and Statistics Articulation Committeeneeds from ACAT in terms of support. ACAT maintains membership lists, and the new website will have a form for new/replacement/resigned members so they can satisfy their requirement to keep Provosts informed of membership.

BCCAT (John FitzGibbon): Shared the Spring 2017 BCCAT Update flier, which is also be available here: http://www.bccat.ca/articulation/announcements/2017-spring-update. John highlighted the following items:

On the BCCAT website can now be found new materials for articulation committees, including a guide for chairs and for new members, and information about how to articulate (sender's guide, receiver's guide). See http://www.bccat.ca/articulation.

The 2016 Council Awards winners are: Alisa Webb, Hilary Rourke, and John Dennison. Nominations for the 2017 awards are open until the end of June. See http://www.bccat.ca/system/awards.

BCCAT will launch the Transfer Credit System (TCS) this spring, and is currently testing it with volunteer institutions. At the moment, BCCAT can only see what students have transferred but in the future will be able to see which transfers came with credit.

Recent publication of interest: Impact of Secondary Education Reform on PSE. See http://www.bccat.ca/pubs/K12Changes.pdf Experiential Education in BC Post-Secondary Institutions. See http://www.bccat.ca/Media/Default/pubs/expeducation.pdf?t=636305288556500976. Applicant Data in Centralized Application Agencies and the Implications for BC. See http://www.bccat.ca/pubs/ApplicantData_Nov2016.pdf.

The Transfer & Articulation Committee (TAC) of BCCAT invites articulation committees or related discipline-based groups to submit project proposals for Transfer Innovations funding for the 2017-2018 year. See http://www.bccat.ca/articulation/projects.

Ongoing projects of interest include: Expanding Gender Declaration in Post-Secondary Information Systems. See http://www.bccat.ca/research/projects.

5.2.1 Inter-Provincial Articulation. Clare Ard commented that the ministry did not approve using the BCCAT software, which would have made inter-provincial articulation easier.

5.2.2 System Initiatives; Pan Canadian Consortium on Admissions and Transfer (PCCAT) will hold their 2017 conference June 8 - 9, 2017, in Toronto. See http://pccatweb.org/pccat-2017/.

5.2.3 BCCAT: 2016 and 2017 JAMs. The 2017 Joint Annual Meeting will be on Friday, November 17th at the Westin Wall Centre Vancouver Airport Hotel, Richmond. See http://www.bccat.ca/articulation/jam.

5.2.4 BCCAT: Pending Requests in the Transfer Credit Evaluation System (TCES). See http://www.bccupms.ca/Documents/Meeting_Documents/Meeting_94_CC/TCES-MATH-STATS-2016.pdf.

5.3 **PIMS:** David Leeming, Educational Associate Affiliation coordinator, gave an overview of the Educational Associate Affiliation program and described some of the members' activities in the past year. See report on page 28.

5.4 **ABE:** Costa Karavas, co-chair ABE Math Working Committee, summarized the March 2 - 3, 2017 meeting of the Adult Basic Education Mathematics Working Group.

1. Adult Basic Education Math Articulation/BCCAT objectives
   a. Exchanging information and enhancing cooperation and coordination among institutions in ABE math.
   b. Promoting course and program equivalency.
   c. Contributing to the facilitation of inter-institutional transfer credit agreements.
2. Foundations pathway
   The committee has worked and created learning outcomes that can be used for a course that is equivalent to the Foundations Mathematics 11 course from high-schools. The Foundations Mathematics 11 course serves as an admission requirement for some Health Science programs such as Practical Nursing, as well as some Introductory Statistics courses in post-secondary.
   The committee will be working on learning outcomes that can be used for a course that is equivalent to the Foundations Mathematics 12 course from high-schools. The committee has decided to delay the project and wait until the Ministry of Education publishes the new grades 10-12 provincial curriculum.
3. Articulation of ABE courses
   Re-articulation of advanced algebraic math courses (equivalent to Pre-calculus 11). Institutions that needed to re-articulate their courses, brought forward their courses to ensure that learning outcomes are up to date and adhere to the guidelines set in the "Adult Basic Education: A Guide to Upgrading in British Columbia's Public Post-Secondary Institutions" guide.
4. Funding for Upgrading courses
   The Ministry of Advanced Education continues to subsidize the delivery of adult upgrading through annual base operating grants for public post-secondary institutions, through the Adult Upgrading Grant (AUG). Many problems have been identified with the AUG funding from various institutions. A motion was put forward to explore the effectiveness of AUG versus the tuition-free model in terms of student access, barriers to education, cost effectiveness, social mobility, student retention, transition to further study and job opportunities for upgrading students.

5. 2016 BCCAT Transfer Awards
   Hilary Rourke, Adult Basic Education Instructor, Douglas College and Articulation Steering Committee Member, was the recipient of the "Transfer and Articulation Community Leadership Award".
6. Reports and presentations

   i. ABE Steering Committee Report – Allison Alder, Co-Chair, ABE Steering Committee.
   ii. BCCAT Update – Ruth Erskine, Committee Coordinator, BCCAT
   iii. Ministry Update – Tegan Tang, Education Officer Colleges and Skills Development Branch, Ministry of Advanced Education (cancelled).
   iv. School of Instructor Education-Bob Aitken, Faculty, VCC. Presentation on "Impact of Cognitive Sciences Research on Training and Learning".

5.5 **Changing the Culture on Friday, May 19, 2017:** Justin Gray encourages us to go to the conference registration page and consider attending. See https://www.pims.math.ca/educational/changing-culture.

6. Institutional Reports

British Columbia Institutional Reports

ACSENDA SCHOOL OF MANAGEMENT – Joyce Kwan

Acsenda School of Management (ASM), located in downtown Vancouver, offers undergraduate programs in business primarily to international students. The Bachelor of Business Administration (BBA) degree with concentrations in Accounting, Human Resources Management, International Business Management and Marketing Management has been offered since 2004. The Bachelor of Hospitality Management (BHM), a four year degree with a 6 month paid internship, opened in 2016.

There are 180 students from over 30 different countries studying at ASM. The largest groups of students are from Korea, Latin America (Mexico, Brazil, and others), and the Philippines. Cultural diversity, along with managing classes where students have a range of post-secondary experiences, continues to be both an asset and a challenge for faculty members who teach at Acsenda.

During the past year, articulation and pathway agreements were signed with the Chartered Professional Accountants (10 courses accepted for the CPA- PREP), the ACCA (Association of Chartered Certified Accountants), Northwest Community College, Columbia College, Royal Roads (BHM to Master Arts Tourism Management), and Saint Louis University in the Philippines.

ASM's Academic Council has approved a new non-credit course, Basic Mathematics (BMTH 099), and it will be launched in July, 2017. BMTH 099 is a bridging course which is designed for new students who need to upgrade their mathematics level to meet the minimum requirement for BADM 120 (Business Mathematics). The contents of BMTH 099 cover from a review on Pre-Algebra topics to Grade 11 non-Calculus topics. The contact hours of BMTH 099 are 3.5 hours per week for each term. This includes a two and a half hour lecture and a one hour Math Lab Session. In the Math Lab Session students practice problems in an informal setting, similar to a tutorial.

The enrollments in BADM 120 (Business Mathematics) and BADM 221 (Fundamentals of Economic and Business Statistics) are steady, keeping the class size between 15 and 20. In the other quantitative study courses, BADM 222 (Management Science) the class size is about 11, and BADM 202 (Operations Management) the class size is between 20 and 27. We expect the class size in BMTH 099 at the pilot stage will be less than 10. All courses are offered four terms per year, except BADM 222 which is offered one or two terms of a year.

ALEXANDER COLLEGE – Keira Gunn

Enrollment in Math courses at Alexander College continues to grow as the college has attained a record number of students again this year.
The demand for our Pre-Calculus course Math 100 has increased dramatically in the last year while student success rates in this class have decreased. As a result, the college will be re-instating Math 99 (Beginner Algebra) for Fall of 2017. The need for even more prerequisite Math courses will be investigated.
Alexander College offered a course in Discrete Math (MATH 115) through the Math department for the first time. This course is part of a long-term goal of offering more second year mathematics courses to fulfill the requirements of an Associate of Science Diploma with Mathematics Concentration.

BC INSTITUTE OF TECHNOLOGY – Winona Cordua-von Specht

- BCIT has no active articulated math or stats courses as the courses are custom for the various programs
- New Data Analytics Certificate offered in Part Times Studies that requires 2 new stats courses (Math 1060, 3060) neither of which will be articulated. Math 1060 was first offered Summer 2016 and runs 3 times a year. The first set of Math 3060 will run fall of 2017. Program appears to be very popular.
- Increase in international students

CAMOSUN COLLEGE – Patrick Montgomery

Camosun College had no course changes last year that would impact any articulation agreements. There were some minor changes to the engineering transfer mathematics courses as a result of an adjustment after changing from a quarter to semester system; however, these all involved program-specific courses that do not articulate.
In general, the Department has seen a slight increase in registrations, mostly in the service courses for business and technology. There were no staffing changes this year, save the regularization of one term instructor (Garret Flowers) to continuing status.

CAPILANO UNIVERSITY – Deanna Baxter

A new course prefix, STAT, was approved for Statistics Courses. Over the coming year, Statistics courses that currently employ the MATH prefix will be changed to STAT. Two new courses were approved in the Mathematics and Statistics department, MATH 123 – "Contemporary Mathematics" and STAT 301 – "Data Analysis In Action". MATH 123 is an introductory level course for non-science students and will fulfill a general education numeracy requirement as well as serve as a prerequisite for introductory level non-science stream math courses. STAT 301 is intended for students in liberal studies or other programs who wish to expand on their introductory level statistics into a more applied data analysis course.
Enrollment in math courses is steady compared to the previous year.

COLLEGE OF NEW CALEDONIA

COLLEGE OF THE ROCKIES – Jim Bailey

Enrollments at College of the Rockies are stable. Engineering continues as a priority for the college, and our strongest mathematics students are in this program. I had only one second year student (in MATH 205 Multi-variable and Vector Calculus) and expect the same this year. This winter we offered MATH 103 (Differential Calculus) and next fall MATH 104 (Integral Calculus) is scheduled. Both are online and use role playing to give a video game feel (zombies bleeding from the eyes and all). These are being developed and taught by an instructor with a MA in Administration, Curriculum, and Instruction from Gonzaga University. This winter we also had a section of STAT 106 (Introductory Statistics) taught by an instructor with a Masters in Mathematics Education (this instructor has taught ABE courses, but this is the first course which he has taught at the University Transfer level).

COLUMBIA COLLEGE – Ana Culibrk

- The enrollment in Columbia College is consistently very good with 2049 students enrolled in the Winter 2017 Term which is the all times high.
- In September, the College will expand into 333 Terminal Avenue. The ELC and our Secondary Program will be housed over the road. We will see some building adjustments at our current building 438 Terminal Avenue, including an expansion of the Library.
- Also, starting September 2017 our secondary program will expand to include grade 10, beside grade 11 and 12 that we currently have.
- Regarding the Math department, we currently have 12 instructors, 8 of which are regular faculty.
- Columbia College operates on three semester program, and each term we offer 26 sections of Math courses on average.
- In September 2015 Columbia College introduced an Associate of Science Degree with Concentration in Mathematics, and each term we offer 4 to 5 second year Math courses which is an increase comparing to previous years.
- In March 2017, we have articulated two new courses:
  Math 105: Introductory Statistics - an introductory course in statistics based on elementary algebra. The emphasis is on applications rather than theory.
  Math 215: Mathematical Proof - a second year course for students majoring in mathematics and science. The emphasis is on understanding different proof techniques in mathematics and writing correct and clear proofs.

COQUITLAM COLLEGE – Gera Belchev

There are no changes to the current courses that will affect the course agreement. We have articulated the transfer of Math 105 to UBC to accommodate our Business and Commerce students. The main reason for that was the UBC requirement for the power series to be covered in 3 weeks.

DOUGLAS COLLEGE – Natasha Davidson

We are running our new diploma, Engineering Essentials, and along with that we are or have offered some courses (already on the books and with agreed articulation arrangements) for the first time – ENGR 1100-Engineering and Technology in Society, ENGR 1180-Introduction to Engineering Analysis (MATLAB course), and ENGR 1190-Introduction to Engineering Desig - all offered Summer 2017. ENGR 2100-Mechanical Fabrication and ENGR 2200-Electronics Design - offered Fall 2017. CMPT 2200-Designing with Raspberry Pi was offered Winter 2017 and had a good response. ENGR 2999- Capstone project a new course, which will have its first offering Winter 2018. Generally – we have a huge demand for introductory statistics courses due to the requirement that students applying to the nursing programs must have first completed such a course – other enrolments are generally good.

KWANTLEN POLYTECHNIC UNIVERSITY – Michael Nyenhuis

Nothing to report concerning credit transfer. Enrolments are steady. Domestic enrolments have declined, and international have increased. The B.A. in Applications of Math is doing well. Two courses we were planning to offer every other year will now be offered every year.

LANGARA COLLEGE – Nora Franzova

Langara college (as many others in BC) is experiencing a large growth of international students. Majority of our IE students are from India, as of this year they surpassed China (2nd place) and Japan (3rd place).
Our IE office has grown in size too, but they are really working hard to help students to be prepared and to be able to join the student population at the right level. Most of the students are now in the Computer Science Program (either Diploma or Assoc. Degree). This Summer term it was 3051 IE students, compared to last Summer with 2007

IE students. Total enrolment for this year's spring semester was 11, 334 students of which 3900 were international students.

New courses: None that would require articulation.
We will be rearticulating 3 courses: Differential Equations, (due to a slight change in prerequisites. We added another possible course), Modelling and Numerical Analysis. For these two we will lower the course from 4 credits to 3, since receiving institutions have the courses as 3 credits only, it is not fair for our students to have to pay for 4. No change in lecture hours though.
We would also like to dispute with UBC the cancelation of transfer credit for MAT1152 and MAT1170 (at least for non-sciences).
The only new courses created are "clones" of existing courses. These are renumbered STAT1123 to STAT4800, STAT3223 to STAT4810, MATH1118 to MATH4800. They were created for out PDD programs. (Post Degree Diploma)

New faculty: Last year we hired 6 new faculty: For math: Jeremy Chiu, Sonoko Nakano, Athena Nguyen, Paul Ottaway (for one course) and Mersedeh Ghassemieh.
For stat: Yew Wei Lim.

No retirements this year.

NICOLA VALLEY INSTITUTE OF TECHNOLOGY

NORTH ISLAND COLLEGE – Jeannie Cameron

There have been no changes to NIC course offerings with transfer implications. The college is currently searching for a new dean for the Faculty of Arts, Science and Technology. Enrolment has been steadily increasing in Math 102 (Calculus for the Life Sciences), Math 151 (Finite Math) and Math 122 (Logic and Foundations). Enrolment remains steady in Math 181/182 (Calculus I/II) and Math 115 (Introduction to Statistics). NIC is contemplating a switch from Maple to Geogebra as the CAS for Math 181/182 labs.

NORTHERN LIGHTS COLLEGE – Hongbin Cui

There have been no course changes at NLC. With the possibility of launching our engineering certificate in 2018-19, there is a hope that our math courses like Calculus II and Linear Algebra will be offered again.

NORTHWEST COMMUNITY COLLEGE – Erfan Zahra'i

UC Mathematics Courses:

- MATH 115 Pre-Calculus: Winter 2018, video conference from Rupert to Terrace and Smithers.
- MATH 101 Calculus I: Differential: Calculus, Fall 2017, Face to Face in both Rupert and Terrace
- MATH 102 Calculus II: Integral Calculus, Winter 2018, Face to Face in both Rupert and Terrace
- MATH 131 Introduction to Statistics, Winter 2018. Face to Face in both Rupert and Terrace
- MATH 235 Linear Algebra, winter 2018, Video conference from Terrace campus to Prince Rupert and Smithers.
- MATH 190 Principles of Mathematics for the Elementary Teacher, Fall 2017-ONLINE

Enrollment 2016-17:

Math 101:

- Prince Rupert: 7
- Terrace: 18 Math 102:
- Prince Rupert: 4

- Terrace: 9

Math 115 Pre-Calculus:

- Terrace: 5,
- Prince Rupert: 3 Math 131:
- Terrace: 29
- Rupert: 9

Math 190: Online 8

Textbooks:
Math 101, 102 and 115 OpenStax
Math 131: Elementary Statistics, Mario F. Triola, Dutchess Community College

Software: Maple

Math competition: 6 participants from Smithers, 3 from Rupert and 1 from Masset(Haida Gwaii).

OKANAGAN COLLEGE – Jason Schaad

Enrollment numbers are up – especially in second year courses. We've hired 3 new faculty members.

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

- We are a department of 16 members (depending on the time of year) 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 offers all first year offerings including all traditionally off-semester first year courses. Penticton and Salmon Arm campuses mainly offer the traditional first year offerings.
- There are no substantial mathematics curriculum changes this year.
- We are planning an expansion over the next two years.
  - OC is planning on offering a degree in Viticulture in Penticton. That will allow us to offer all off-semester first year courses at this campus.
  - The Business department is developing a post baccalaureate degree in Data Analysis and Analytics for which we will be offering 5 courses. Of the 5, Two will be new courses: Regression Analysis and Modern Statistical Methods.
  - The Sustainable Construction Management Technology at the Penticton campus has been running over the past 2 years. It has recently become an ongoing program with ongoing funding. This increases our course offerings in Penticton by 1.
  - Lots of expansion due to international students in associate of science and business
  - The Kelowna campus will begin the 1st year of a 2 year international expansion in the Associate of Science program. This will increase the number of 1st year AS offerings from 7 (plus 14 labs) to 12 (plus 24 labs). Similar increases will be made to 2nd year in the 2018/2019 year.
  - The Business department will also begin an international expansion which will increase our service offerings by an estimated 5 – 7 sections over the next 2 years.
- Enrolment in Mathematics and Statistics was up over the last year, with a slight increase in UT Math/Stats and a slight decrease in business. There was a significant increase in second year enrollments, especially Calculus III, Linear Algebra, Discrete Structures and Mathematical Structures and Proofs. Currently, applications in Science are up slightly over last year.

- In Kelowna, we are now offering 2 sections of Precalculus in the fall with 1 in the winter, 4 sections of Calculus I in the fall with 2 in the winter with 3 sections of Calculus II in the winter and 1 in the summer. These were all filled to capacity. We offer 2 sections of Calculus III in the fall and 3 sections of Math 251 (Discrete Structures) in the winter semester. All other UT Mathematics courses are single sections though there is a strong push to increase the number of sections of Stat 230 and Linear Algebra.
- We are in the process of hiring 3 faculty members this year. One of whom is based in Penticton.
- We continue to host the Math Challengers event for the Okanagan Region. Satoshi Tomoda is the principle organizer.
- Of course, 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.
- We are moderately concerned about how the high schools will roll out the new mathematics curriculum. We are keeping an eye on how our prerequisites may (or may not) change as a result.
- We are working diligently on "reforming" Math 160, Mathematics for Elementary School Teachers, so that it does not look or feel like a remedial course. Content in the course is at a post-secondary level but our calendar description does not reflect the real level of rigor.
- Finally, we've spent too many hours this year fending off other departments (like geography, psychology, and nursing) who feel that they are better qualified to teach statistics courses than is the statistics department. I would encourage all of you to be very cautious when you grant statistics transfer credit to one of these non-statistics departments.

Other than that, all's quiet at OC.

QUEST UNIVERSITY

ROYAL ROADS UNIVERSITY

SELKIRK COLLEGE – Doug Henderson

Selkirk offered no new math courses this past year (we didn't lose any, either, although we did offer an extra session of Math 051 (Pre-Calc 12) in the spring semester (May – June) largely due to demand from international students. Student numbers continue a slight increase (a pattern seen over the last few years) due mainly to 3 factors: international students (mainly taking our business programme which has a math course and a stats course), new programming (rural pre-medicine) and re-introduction of previously suspended programming (first-year engineering).

No new courses are planned for the 2017-18 school year. There have been preliminary investigations into developing more second-year options for engineers, which may bring back Calculus III and our O.D.E. course at some point in the future (however, these changes are at least a few years down the road, if they happen at all).

SIMON FRASER UNIVERSITY – Justin Gray

There is very little to report this year. The only course or programme change that has been approved by senate is a change to the calendar description of MACM 401 (Introduction to Computer Algebra).

Overall enrollment in math courses is up 3.1% from last year.

SFU has made some minor changes to the residency requirements concerning transfer credit. The new requirements are as follows.

The University may award substantial transfer credit for course work that has been completed elsewhere. These transfer units reduce the amount of work needed to complete a Simon Fraser University credential, subject to minimum residency requirements for work completed at Simon Fraser University. Overall, the residency requirements define two conditions that apply to every program.

- At least half of the program's total units must be earned through Simon Fraser University study
- At least two thirds of the program's total upper division units must be earned through Simon Fraser University study

These conditions apply to all undergraduate degree, post baccalaureate diploma and certificate programs and programs that form part of an overall degree program for example, major, honours, minors, etc.

We recently hired a new continuing lecturer, Sophie Burrill. Mary-Catherine Kropinski is our new department chair.

THOMPSON RIVERS UNIVERSITY – Suzanne Feldberg

Enrollments are steady.

We now have a new Master of Education in STEM program for interested students.

We have a new Master of Science in Data Science degree that is in the approval process.

We have advertised a Tenure-Track position in Statistics/ Data Science.

We hired a new Canada Research Chair.

THOMPSON RIVERS UNIVERSITY (OPEN LEARNING)

TRINITY WESTERN UNIVERSITY – Rick Sutcliffe

Trinity Western University is a fully accredited privately funded public Christian university offering a variety of graduate and undergraduate programs in the arts, humanities, fine arts, sciences, education, theology, and professional studies. Opened in 1962, it currently has approximately 1,400 domestic and 500 international students enrolled full time, as well as 2,000 part time.
The Mathematical Sciences department is part of the Faculty of Natural and Applied Sciences and encompasses Mathematics, Statistics, Computing Science, Physics, and Pre-Engineering. The department offers majors, concentrations, and minors in Mathematics, Mathematics with Computing Science, Computing Science, as well as a concentration and minor in Physics. (The Department also offers ancillary courses for our other science majors – Biology, Biotechnology, Chemistry, Environmental Studies – as well as for TWU's Schools of Business, Nursing, and Human Kinetics.)
Our courses and programme requirements (checklists) are listed in the university calendar http://www.twu.ca/calendar. Some general science take a concentration in Mathematics to go along with a Chemistry or Biology major. In the past there have been students completing a Math major along with majors such as Human Kinetics, Nursing, Music, and History.

Enrolment records and some success rates for some first-year courses:

Course	Enrollment (5 year avg)	Enrollment (2016-17)	Passing Rate (2016-17)
Precalculus (105)	23	26	
Calculus I (123)	108	122	86%
Calculus II (124)	41	43	88%
Elem. Educ. (190)	41	47	98%
Math. For Business (101)	153	151	
Nursing Stats (108)	49	48	
other Stats (102)	65	53	

UNIVERSITY OF BRITISH COLUMBIA - OKANAGAN – Wayne Broughton

Our enrolment numbers in Calculus I and II were up substantially (about 25% increase) from the previous year.
We are currently in the process of revising our "business calculus" course (MATH 116, Calculus I for Economics and Management) to bring it in line with the Core Curriculum standards and to make it substantially equivalent to our "science calculus" course (MATH 100). In particular, we are adding limits, trigonometric functions, Newton?s method, and Taylor polynomials. In addition, the prerequisites have been upgraded to match our MATH 100 (i.e. 67% or higher in Precalculus 12). A successful trial run of this revised curriculum was conducted this year. It is expected that these changes will be approved and in place for September 2018.

UNIVERSITY OF BRITISH COLUMBIA - VANCOUVER – Wayne Nagata

There have been no changes in the past year that affect transfer agreements.

Here is a link for the Calculus Challenge exam, to be held at UBC on June 8, 2017: http://outreach.math.ubc.ca/calc_challenge.html/ and here is a link for a report on the 2016 exam, held at SFU: https://www.sfu.ca/math/students_teachers/calculus_challenge_exam/exampractice/exam-report---2016.html

UNIVERSITY OF THE FRASER VALLEY

We have a new statistician in the department, Dr. Longlong Huang. This new position in our department was created due to increasing demand for statistics service courses, mainly from growth in Business and Computer Information Systems, as they attract more international students.
Our new Applied Statistics Minor goes live this Fall. It is rather unique in that it does not require any courses in Calculus. As a result, a double minor in Math and Applied Stats, either in Arts or in Science, is a possibility. We imagine the Applied Stats Minor combining well with other sciences, as well as with programs in Economics, Criminology, Business, for example.
Our new course "MATH 123: Everyday Math and Stats" also goes live this Fall. It is the first time that our department has offered a team-taught course. One instructor will specialize in math, and the other in stats and financial math. This course was designed to satisfy the Quantitative requirement in our recently revised BA degree, and we look forward to it being a math/stats course that students take to satisfy a requirement - but then really appreciate and enjoy.
We have been accepting Foundations of Math 12 (with a grade of B or better) as a possible prerequisite for entry into our Business Calculus one-semester course. However, recent data from our Office of Institutional Research strongly suggests that Foundations of Math 12 is not preparing students well for the demands of Calculus, and we are moving to remove it from the prerequisite options. Interestingly, we also discovered that students entering any our first-year courses (Calculus, Discrete Math, Statistics, or Math Ed) with only a C- in Precalculus 12 were at very high risk in all of these courses.
Some instructors in our department have been experimenting with group tests and exams, which typically include an individual component followed by a component solved and written up by groups of 2-3 students. We'll likely have more experimentation with these in the coming academic year, and we'll be interested in sharing what we have found with others, and hearing about others' experiences, at Capilano in 2018.
We have also begun looking at WeBWorK as a possible online homework platform for some of our courses, to decrease reliance on commercial versions of online homework systems, and possibly to aid in the transition to open textbooks in the future.
For more information about any of these initiatives, please contact Ian Affleck at mathstat.head@ufv.ca.

UNIVERSITY OF NORTHERN BRITISH COLUMBIA

UNIVERSITY OF VICTORIA – Gary MacGillivray (in absentia)

We have two new courses.

The first is Math 248, Computer Assisted Mathematics and Physics. It is a new requirement in most of our programs. It replaces Computer Science II. The goal of the course is for students to learn use a high-level computer language

for mathematical and scientific experimentation, simulation, and calculation. The prerequisites are linear algebra, multivariable calculus, and Computer Science I.

The second is Stat 123, Data Science. It was created in conjunction with the repurposing of our Combined Program in Computer Science and Statistics as a Data Science program.

VANCOUVER COMMUNITY COLLEGE – Costa Karavas

1. Existing and new courses
   The Mathematics Department in the School of Arts and Sciences offers multiple sections of Calculus I (MATH 1100), Calculus II (MATH 1200), Precalculus (MATH 1020), Discrete Mathematics (MATH 1120), Applied Linear Algebra (MATH 1221) and Introduction to Statistics (MATH 1111).
   New courses have been introduced which will complement the Associate of Science and Associate of Arts degrees (in progress). The new courses are: Calculus III (MATH 2251), 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). Articulation transfer request has been initiated through BCCAT with BC institutions.
2. First Year Transfer Programs
   First-year certificate programs in Engineering, Computing Science and Software Systems, and Environmental Studies provide the option to VCC students to complete their 1st year courses at VCC and then transfer to SFU by assured or competitive admission, or to UBC by competitive admission. The certificate programs have increased enrolment in the existing calculus courses. The certificate programs were launched in 2015. Students can start during any semester and all course credits must be obtained within sixteen months from the start of their first semester. In addition, for at least two of the semesters at VCC, students would need to meet a minimum course load of 12 credits, and an overall average GPA of 2.75. Few students have completed last year and we anticipate more first-year graduates by the end of the summer 2017 semester.
3. 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).
4. Software
   MAPLE (by August 2017) 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 – Cobus Swarts

We did not make any changes to our courses this year. Our mathematics major has been approved by Senate and is on its way to the Board and the Government; we hope to start it next year.

YUKON COLLEGE – Jaclyn Semple

Yukon College offers three university transfer level courses: Calculus I (Math 100), Calculus II (Math 101), and Introductory Statistics (Math 105). We are planning on using an open textbook for Math 105 this winter (likely OpenStax Statistics). Currently there are no plans for any new math courses, but that could change as we move towards becoming Yukon University over the next five years.

Alberta Institutional Reports

Concordia University of Edmonton – Andreas Guelzow

During the last years we have seen increases of about 10% per year in Science. This has significantly increased enrolment in our first and second year courses.
In the past we offered our first term calculus course under two course codes: MAT 113 for students without high school calculus and MAT 114 for those with high school calculus. Otherwise these two courses were identical. We have now combined them under the MAT 114 code (following what the University of Alberta has done.)
We also introduced a new course MAT 250 Introduction to Mathematics of Finance and reactivated MAT 241 Geometry 1, a course in euclidean plane geometry. This course is intended especially for students planning to enter the University of Alberta's post-secondary education program.
Changes in Concordia's structure now sees Mathematics as part of the Department of Mathematical & Physical Sciences, which is home to Mathematics, Computing Science, Chemistry, Physics and Earth Sciences.

7. **Reports**:

7.1 **BC Secondary Schools Mathematics Contest:** Suzanne Feldberg.
Proposed dates for the next contest are: Friday April 6th (preliminary round) and Friday May 4th (final round). Should have first drafts for the contest by the end of the summer. All help is welcomed. If you have questions, send them questions (.tex preferred). Shane will be reporting results on their website.

7.2 **Calculus Challenge Exam run by UBC and SFU:** Wayne Nagata.
Will be hosted by UBC June 8th, 2017 and by SFU in 2018. Note that students can write the exam off-site with a proctor (usually their teacher). See http://outreach.math.ubc.ca/calc_challenge.html/
Justin Gray says that in 2016 they had 42 students participate, 33 of whom passed the exam. Some of these students are also writing AP Calculus exams.
David McNeilly says that at University of Alberta they do not permit students who have taken Math 31 in the high school to challenge the exam. However, they do permit students who have taken IB calculus to do so.

7.3 **Math Challengers** – Leo Neufeld

Math Challengers is a competition for Grade 8 and 9 students who love math and excel in doing it. 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-on to see who first solves a problem. Parents, coaches and the other competitors thoroughly enjoy the excitement of this elimination round.
This year approximately 695 students participated at the Regional level. Grade 8 teams came from 29 different schools and Grade 9, from 46 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 SFU this year. It's a really fun and enriching day for all!

Math Challengers 2017 Regional Competition

Grade 8	Lower Mainland	Vancouver Island	Okanagan	Fraser Valley	Prince George
Schools	25	3	3	7	1
Teams	44	6	4	11	3
Competitors	200	30	20	55	15
Grade 9					
Schools	29	5	5	7	-
Teams	50	8	7	10	-
Competitors	250	40	35	50	-

Again this year, twenty Grade 9 students selected from high scoring individuals at the Provincial competition are invited to a Post Provincial Day held at UBC on May 27. The day will be spent touring demonstration facilities, hearing talks on math and engineering topics, being presented with challenging puzzles and enjoying a special lunch on campus. This is an experience that students will not forget!

All this is possible because of dedicated volunteers and committed teacher coaches, as well as financial assistance from organizations like PIMS, BCAMT, BCHydro, IBM and APEGBC. UBC, SFU, BCIT, Camosun College, Okanagan College, UFV and now 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 now in Prince George. Organizers are Satoshi Tomoda (Okanagan), Ian Affleck (UFV) and Erin Beveridge (UNBC, first time 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 could easily become new start-ups.

For more information about Math Challengers:
https://www.apeg.bc.ca/Math-Challengers/Math-Challengers-Home
For previous competition problems:
https://www.apeg.bc.ca/getmedia/5cfa019a-f50b-4a12-97b0-e8ebf020ce71/Quest-Archive.pdf.aspx

7.4 **BCAMT:** Deanna Brajcich. See item 5.1.

The Tuesday session of the BCcupms adjourned at 5:18pm
(moved by Natahsa Davidson and seconded by Rick Sutcliffe)

Wednesday, May 17, 2017

Plenary Session

8. **Opening remarks.**

8.1 **Announcements from the host.** Robert Woodrow provided information about technology and food service in the room. Leo Neufeld thanked the volunteers who arranged safe transportation to and from dinner last night.

8.2 **Introduction of representatives.**

8.3 **Attendance lists:** Deanna Baxter circulated the attendance lists.

9. **Business arising from the 94rd meeting:**

9.1 **UBC Mathematics Department and the necessity of series in all Calculus II courses.**
The chair (Jim Bailey), with the help of John FitzGibbon and Rob Fleming (BCCAT), contacted two deans from UBC, Ian Cavers, Associate Dean Academic (who is responsible for the Faculty's curriculum process) and Paul Harrison, Associate Dean, Student Services.
Mark Mac Lean has been contacted and is aware of the situation. Jim Bailey told the committee that a solution will require detailed curriculum planning and will take time, but is in process.
Wayne Nagata added that he has also been in communication with Mark Mac Lean and that currently they are in consultation with the business and economics schools. Wayne Nagata will report further at next year's meeting.
Susan Oesterle sought clarification about what will happen in the interim. We assume that the current articulation agreements will stay in effect. Gera Blechev reported that Coquitlam College has had their course declined by UBCV. Wayne Nagata said that he believes things will stay the way they are in the meantime.
Deanna Baxter pointed out that the BCCUPMS has a published agreement about core calculus, which includes sequences and series as an optional topic in the section on business calculus, and asked whether we need to revisit this core calculus agreement. Jim Bailey pointed out that the core calculus agreement will be reviewed next year and discussed later in this afternoon. Ian Affleck pointed out that even in the science calculus series is listed as an additional topic. Justin Gray suggested adding something to the website in the meantime, to avoid confusion, such as a note to indicate that it is no longer current to have series listed as 'additional' on the business calculus section.
Michael Nyemhuis asked whether Life Sciences requires series, too, because that now is considered science at Kwantlen Polytechnic University. Wayne Nagata responded that they are now required to include series in their life sciences calculus, and the impetus is a concern that students might try to get into an Engineering degree with business calculus. If the courses were to be decoupled then this would not be a concern, but keeping the courses equivalent is much simpler from an administrative perspective when dealing with so many thousands of students.
David McNeilly shared that in Edmonton they do have a problem with students who transfer into Engineering having taken the lighter calculus course (which contains no series). The current solution is that Engineering requires a higher mark from that course. They are considering an online supplement course to fill the missing subject. Justin Gray said that at SFU they list them as mutually exclusive rather than equivalent, and require higher grades from the lighter courses, while Cobus Swarts said that at VIU they do offer a supplemental calculus course (polar coord, sequences and series, complex numbers), but it has been a headache: students have found ways around it and do not see the value of the course.
Action item: Wayne Nagata will keep the committee informed of progress at UBC Vancouver.

9.2 **Open source textbooks.**
Jim Bailey continues to use and be satisfied with Lyryx.

9.3 **Making Mathematics Accessible to Visually Impaired Students.**
College of the Rockies uses Kurzweil text-to-speech software, which requires a Firefox plugin. Jim Bailey tried making MATHML versions of his midterms but was not able to get it to work satisfactorily. This may have something to do with how the IT department has the computers locked down.

9.4 **Academic dishonesty** – Kevin Craib
At Langara, Kevin Craib has seen a growth in cheating among international students. Langara is actively looking for ways to alleviate this problem. Kevin asked: are other institutions noticing this problem, and what are they doing? The types of cheating he is seeing include students speaking openly (not in English) with other students during the test, and students exchanging papers during the test. He has provided instructions early in the term about expected test behaviour, randomly seats them during tests, and uses solo test dividers.
Members shared their own experiences with academic dishonesty, their thoughts about the causes, and their means of combating it.
Types of academic dishonesty members reported included:

- students reading neighbours' test papers
- students interpreting 'individual work' to mean 'group work but individual write up'
- students interpreting 'individual work but individual write up' to mean 'one individual writes it up and the rest make copies'
- students making use of CourseHero, proofwiki, and other online repositories of solutions (some online services will also do students' homework for a fee)
- students using reports written in a different language, translated to English with Google Translate
- students smuggling smartphones into the washroom for use during a test

Suggested causes for the rise in academic dishonesty included: international students being unaccustomed to Canadian conventions regarding academic honesty, and domestic students being used to a culture of collaboration and cooperative learning, and then misinterpreting what would be considered appropriate behaviour in the college or university setting.
Methods of combating academic dishonesty included:

- Reeducation (COTR has added an orientation for international students, Camosun has developed a handout, Douglas College also does an orientation for international students.
- Strict penalties and good record-keeping (Douglas College now has an "FD" grade that can be assigned for a student caught cheating – Failure due to Academic Dishonesty. Alexander College has a zero tolerance policy on cell phones in exams. Reporting all instances of cheating to a central office helps to determine when it is an isolated incident and when it is part of a pattern of behaviour.)
- Preventing line-of-sight to neighbouring test papers (Capilano and Langara use exam dividers, but Alexander College has found these reduce line-of-sight for the invigilators too);
- Restricting washroom breaks during tests (such as forbidding them entirely, having TAs walk students to and from the washroom, permitting only single-occupancy washrooms to be used and checking it for notes before and after each use, having a two-stage exam so students must turn in stage one before their washroom break and may not see stage two until after their break)
- Restricting permitted items in tests (cell phone collection, no hats, no coats, no food items with printed matter on them)
- Using multiple versions of test papers (Jason Loeppky reports that he permutes the order of questions on his exams but that the students don't know this and so students who copy their neighbours are easy to spot; other instructors colour-code the test papers to discourage students from copying in the first place)

- Sharing resources with colleagues from other departments (English, for example, is used to plagiarism detection)

Parallel Sessions

10. **Mathematics Session**—Chairs: Jim Bailey, David McNeilly

10.1 **Report from the Calculus Readiness Test Subcommittee** – Justin Gray.

The goal of the CRT Subcommittee was to develop a 30-item diagnostic test to determine readiness for calculus. These test items were based on the BCCUPMS Mathematics Proficiencies Project Report (Leo Neufeld). The first version of the resulting test was administered in free-response format to students at four volunteer institutions: COTR, Douglas, Langara, and UNBC. A multiple-choice version was developed based on these students' incorrect answers, after which it was possible to introduce randomization. In cases where the team involved was not able to determine the *source* of the students' incorrect answers the randomization was minor.

During the Fall 2016 term, COTR, KPU, and UVic administered the multiple-choice and randomized version of the CRT to their introductory differential calculus courses and forwarded anonymized results for analysis.

Please see the full analysis of these results, using Richard Taylor's app, at http://legendre.tru.ca/readiness_tests/ under the Dataset `BCcupmsCRT2016.csv`. The course pass line was 50% for all of the courses involved, but note that UVic students had only 45 minutes to write the test, COTR students had 90 minutes, and KPU students had 120 minutes. This means that UVic students may have under-performed on the CRT. Students were all permitted the use of a basic scientific calculator.

Some of the test items proved to have weak correlation with course grade, usually because the question was hard for nearly all students (approximately 20% of students got each of those questions correct). Those questions were also in the last ten problems on the test. These problems should be replaced.

Estimated probability of failing the course given a score less than x and estimated probability of passing the course given a score greater than x are available on Richard Taylor's webpage and in Justin Gray's slides.

Discussion:

The Mathematics subcommittee discussed ways to improve the CRT in preparation for the September 2017 round of testing. Deanna Baxter suggested that the predictive nature of the test could be improved by adding more questions, so that more than one question tests each of the proficiencies. The CRT Subcommittee will replace the questions that seem to be non-predictive, and Suzanne Feldberg suggested that first they delete those scores from the data set and then rerun the statistical analysis on *this* data set. Some of the questions currently included also seem to be too easy and should be replaced.

Action items:

The CRT Subcommittee will replace the problematic questions and test the resulting CRT in Fall 2017. Anyone who is interested in administering the CRT in Fall 2017 should contact Justin Gray jgray@math.sfu.ca

There was also discussion about how to use the test. Justin Gray said that the purpose of the test is up to the individual institutions, but he did not envision it as a gate-keeper test. He said that the original intent, and the reason the CRT subcommittee was formed, was to design a placement test that would replace the individual institutions' placement tests. Given that our calculus courses are well-articulated, he said that it seems reasonable that our placement tests should be articulated as well. If the CRT turns out to be a good test then SFU would consider switching from their current placement test to the CRT. At this time, SFU uses its own diagnostic test to determine whether their calculus students should participate in a calculus support program or not, not as a test to bar entry to calculus. Ian Affleck suggested the BCCUMPS share the CRT results with high school teachers (with the preface that it includes international and out-of-province students) to inform their instruction. That could show the teachers what skills we value in students, and which skills we see our students have lost.

Roberto Bencivegna expressed an interest in trying the CRT at Red Deer College, and asked how Alberta institutions could access it and whether it was available online for students to access. Justin said that this test is not available to students online, and that keeping the test somewhat private is important (although the randomization helps mitigate consequences of leaks). The test itself belongs to the BCCUPMS, and so this body should determine whether the test can be shared and if so how security is to be maintained.

Action items:

The CRT Subcommittee will consider mechanics by which the CRT can be shared with Alberta.

A member of the ACAT Mathematics and Statistics Articulation Committeeis invited to join the CRT Subcommittee.

Finally, Justin Gray pointed out that students struggle in our courses for a variety of reasons. A lack of prerequisite knowledge is one source of struggle, but so is lack of engagement, perseverance, personal problems, poor study skills, etc. These things are difficult to measure, but do often go hand in hand with a weak background in prerequisite material. A diagnostic like this one might still be able to identify these students who are at risk.

Justin Gray's presentation is available here: http://www.bccupms.ca/Documents/Meeting_Documents/Meeting_95_UCal/Calculus_Readiness_Test.pdf

10.2 **Introductory Linear Algebra Study** – Jim Bailey.

Jim Bailey reported on results of the Linear Algebra Subcommittee (Jim Bailey, Nora Franzova, Michael Nyenhuis, Claude Laflamme, and Wesley Snider). His analysis is based on a Barycentric Partition of the responses.

Jim reported that there was a lot of agreement about what responding institutions considered to be "core". Recommendations, modelled after the core calculus report, are published in the subcommittee's report: available on the BCCUPMS website at http://www.bccupms.ca/Documents/Project_Documents/Core_Linear_Algebra_Analysis_2017-04-26.pdf.

Discussion:

Justin Gray asked for clarification about how courses were categorized as "Science Linear Algebra" or "Linear Algebra for Engineering". The form used to build the report described "Science Linear Algebra" as "the course which the majority of students take" while it described "Linear Algebra for Engineering" as having "fewer topics and applications . . . from applied science". Costa Karavas pointed out that in spite of this description Engineering students require some topics, such as complex eigenvalues, that are considered to be "additional" for the Science Linear Algebra.

The committee discussed the ways that different institutions organize linear algebra: some have a single course (University of Calgary, for example) while some separate the Engineering students into a different course. At UBC Okanagan, they are currently finding it difficult to offer a single linear algebra course for all of the science students; the various programs whose students take the course each feel some important topics are missed, but adding all of those topics might not be possible in a single course. Claude Laflamme responded that at University of Calgary they include every topic that every user program requires, which makes their single linear algebra course quite computational, really a first course in applied linear algebra.

Some editorial changes were suggested. First, to rewrite the "core" and "additional" topics lists to remove confusing artifacts such as the header "Inner Product Spaces, Proofs" that has only "Students must write simple proofs throughout the course" as a sub-header because all of the inner product spaces subtopics ended up in the "omit" list. Second, to clarify that topics listed under "omit" can be used in the 25% non-core portion of the Science Linear Algebra course (see motion below). Third, to reword recommendation #2 to remove reference to "sending" institutions.

There was much discussion over whether "vector spaces" should be considered "core" or "additional". Some members expressed confusion over what had been meant by "vector spaces" in the report and on the survey form. Jim

clarified that in the form the definition of each topic and subtopic was based on this open source linear algebra textbook: https://lyryx.com/lscs/Kuttler-LinearAlgebra-AFirstCourse-2014A.pdf, and section numbers were included so respondents could look up the topics there. David McNeilly said that at UofA they look at $\mathbb{R}^n$ and subspaces of $\mathbb{R}^n$, and so reported on the form that "vector spaces" are "omitted". Ian Affleck said at at UFV they do consider vector spaces to be "core" and reported it on the form accordingly. Some respondents did seem to have been confused by the meaning of these topics on the form, however; Vancouver Community College indicated that "subspaces" and "linear independence and bases" were "core" topics while "algebraic considerations" (which includes the definition of vector space) was "additional". Langara indicated that "linear independence and bases" were "core" topics while "algebraic considerations" and "subspaces" were "additional". This logical inconsistency suggests confusion on the part of respondents, and could be why Jim Bailey's initial analysis recommended that 9.1 be listed under "additional" while 9.2 and 9.3 is listed under "core".
Various solutions to this problem were suggested:

- Removing 9.2 and 9.3 from "core". Some representatives objected to this on principle, and Jim Bailey pointed out that it would not accurately reflect the results of the survey.
- Adding 9.1 to "core", which garnered the same objections as the previous suggestion, from different representatives.
- Accepting that some institutions teach "vector spaces" by using $\mathbb{R}^n$ as an example. This would, however, introduce redundancy in the "core" topics list because it already included "Spanning, Linear Independence and Basis in $\mathbb{R}^n$" as a core topic, including "Subspaces and Basis" in $\mathbb{R}^n$.
- Rewriting the topics list completely, to detach it from the specific book. Jim Bailey pointed out that doing so would remove context from the survey form, but accepted this suggestion for redrafting the report as long as the form remained unchanged. David McNeilly and Claude Laflamme volunteered to do so.

Motion: (moved by Justin Gray and seconded by Eugene Belchev)

That the recommendations in the report be adopted with the following changes:

- That the sentence on page 6 be reworded to: "Coverage of this material should constitute approximately 75% of the course and the remaining 25% may be topics chosen from the Additional Topics list"
- That the list of omitted topics be moved from the Appendix to "Additional Topics"
- That the section numbers be removed from the topics list (but not from the form in the appendix)
- That the topics currently listed as 9.2 and 9.3 be moved from "Core Topics" to "Additional Topics"
- That the topic "Vector Spaces" be renamed "Abstract Vector Spaces" in the topics list.

Carried by a vote of 23 in favour and 2 against.

Justin Gray reminded the committee that SFU offers another Linear Algebra course, intended for Engineering students, that does not include Abstract Vector Spaces or proofs, and so if a course does not transfer to MATH 240 they could consider articulating it to MATH 232 instead.

10.3 **Use of Calculators in First Year Calculus Courses, and Implications for Transfer.** David McNeilly.
Discussed in **12.2**.

Stat. **Statistics Session**—Chair: Bruce Dunham
(Please see the complete Minutes of the Statistics Subcommittee on page 34.

Plenary Session

11. **Highlights from the parallel sessions** (details will appear in the minutes.)

Statistics: Julie Peschke helped to identify core and additional topics for introductory statistics courses. This will not override existing articulation agreement, and is intended only as a guide; it may be useful for people designing new courses. That report, after some editing, will be available on the website. The subcommittee discussed the new Statistics grade 12 curriculum, and have provided feedback to the Ministry. They hope to get in touch with high school teachers who will be teaching the new material. Bruce Dunham is continuing to try to obtain a provincial license for Minitab. The subcommittee also discussed open-source textbooks and resources.

Mathematics: Justin Gray gave his report on the Calculus Readiness Test that a group of BCCUPMS members have been developing for a number of years. A multiple-choice version with student-generated distractors has been piloted now; a power point of the analysis will be made available on the website. The next step is to replace some questions and to do more testing in terms of this being used as a diagnostic to predict success. Jim Bailey gave his report on the Core Linear Algebra study, which was based on a fillable form that nearly every BC institution filled out. Based on those results, Jim Bailey determined which topics seem to be considered "core" or "additional" or are typically omitted. The resulting recommendations, with some modifications, were accepted and will be available in revised form on the website. This report will not override existing articulation agreements.

12. **New business:**

12.1 **Course credits** – Leo Neufeld.
Different institutions allocate credits to their courses in different ways and for different reasons; it is often linked to fee structures. Leo Neufeld wanted to know: what happens when a course is transferred? For instance, as Chair at Camosun Leo was aware of a 4.0 credit course at Camosun that transferred to a 3.0 credit course at another institution – and when accepting the course the receiving institution decided to award the student 4.0 credits rather than 3.0. This did not seem to be an appropriate choice to Leo.

If, as seems to be the case, some institutions are allocating credit as a measure of the value of a course in terms of learning and others are allocating credit as a measure of instruction hours (and therefore cost to provide), Leo suggested that these discrepancies are likely and posed the question to the committee: What is the appropriate thing to do when transferring a course that has a different credit value at the sending vs receiving institution? Leo's stance is that the credit granted to the student should be determined by the credit value assigned to the course *at the receiving institution.*

Discussion:
Representatives from different institutions reported different ways in which the credit is transferred, so it does appear to be inconsistent. Deanna Baxter believed that at a student who transfers to Capilano is granted credit based on the Capilano course – the balance can be granted as an unassigned credit. Jane Butterfield reported that based on an example student it seems that UVic grants exactly the credit associated with the UVic course. The balance is not, as far as she could tell, granted as unallocated. From Alberta, Roberto Bencivenga reported that at Red Deer College, courses in fact have two credits associated to them: one for billing and one for transfer.

No action was suggested.

12.2 **Use of calculators** – David McNeilly.
University of Alberta has been seeing students transferring, particularly from then United States, from calculus courses that were required to include graphing calculators. David reported that they are not sure how these should affect transfer to a traditional calculus course.
Rick Sutcliffe said that at TWU they have two instructors teaching Calculus 1, one who does use and one who does not use calculators. Both groups seem fine in Calculus 2, where the instructor does use calculators.
Deanna Baxter said that Capilano does use graphing calculators in their calculus courses, but their learning outcomes are still clear (e.g. students are expected to be able to calculate limits algebraically). In considering

how to transfer these courses, Deanna recommended that institutions consider the learning outcomes: if those outcomes are mostly technology-based then it might not transfer.

12.3 **Instructor qualifications** – Jim Bailey.

At COTR, the new VPA wrote a new instructor qualification policy, which stated that, for university transfer, a course must be taught by an instructor with a masters in the subject or related subject, or a masters in education. Jim Bailey reached out to mathematics representatives at the research universities to determine whether they would accept this assessment for transfer, and overwhelmingly the response was no. Subsequently the VPA removed the reference to the masters of education. Jim told the VPA that this was satisfactory, and he would report that to the BCCUPMS. When Jim pointd out that there were instructors teaching at the college who were not qualified under the new plicy, Jim was told that he could tell the BCCUPMS that senior management is "addressing this situation", and when Jim asked for clarification he was told that senior management is "addressing" rather that "dealing with" the situation.

Jim Bailey has since become aware that

1. during the winter semester 2017, a face-to-face section of STAT 106 (Introductory Statistics) was taught by an instructor with a Master of Education, the first time this instructor has taught a course section at the university transfer level;
2. during the winter semester 2017, a new online section of Calculus 1 was taught by an instructor with a Master of Arts in Curriculum Development; and
3. a new online section of Calculus 2 has been developed by the instructor with an M.A. in Curriculum Development, which is scheduled to be offered by that instructor in the fall of 2017.

The qualifications of the two instructors are:

1. B.Sc. Mathematics from UVic; M.A. in Administration, Curriculum, and Instruction from Gonzaga University (online). This instructor has been teaching Finite Mathematics and Statistics at CotR for some time; and
2. B.Sc. Chemistry from UBCV; M.Ed. (Mathematics Education) online, (Montana State University). This individual has taught at the ABE level, and has been in charge of labs for chemistry, mathematics (using Maple) and statistics (using Excel) at the university transfer level, in all cases not presenting new material and using materials that were developed by the instructor.

Discussion:

Deanna Baxter asked how hiring of instructors is conducted; is the Mathematics Department not involved in the hiring process? Jim Bailey reported that one of the instructors in question was hired as an A.B.E. instructor (for which he is qualified) who has now been assigned work in the Mathematics Department.

Justin Gray pointed out that BCCAT has a statement on instructor qualification. It used to be the case that instructor qualifications were included with the course outlines during articulation agreements, but now BCCAT has the following position on instructor qualifications:

"BCCAT expects institutions participating in the BC Transfer System to develop and/or make explicit and accessible their policies on instructor qualifications... It is reasonable for any receiving institution upon occasion to seek assurance as to the hiring policies or practices at a sending institution, or to request specific information about the qualifications of an instructor for an articulated course."

See http://www.bccat.ca/articulate/request/instructor

Susan Oesterle recommended that following BCCAT guidelines is most likely to lead to desirable outcomes. Justin Gray pointed out that not only the institutions that receive COTR students are affected here; the BCCUPMS has a need to protect the integrity of articulation generally. SFU has now requested reassessment of some COTR courses.

Ian Affleck expressed a concern that in the future an instructor who does not happen to hold a relevant degree

might provoke an articulation challenge even if they do have the trust of the home department. Susan Oesterle agreed that this subject involves non-transfer issues and collective agreements. Natasha Davidson shared that at her institution they do have a "qualified to teach" list, and that it would not be acceptable for an administrator outside of the department to add someone to that list for a mathematics course. At COTR, seniority for certain subjects can be accumulated by teaching incidentally for long enough and that seems to have been what happened here.
David Leeming asked whether Susan Oesterle, as SLP, can bring something forward to BCCAT.

Motion: (moved by Rick Sutcliffe, seconded by Costa Karavas)
That this body affirm that the qualifications of instructors teaching within an academic unit meet the broad approval of specialists within that academic unit, consistent with the BCCAT position statement on instructor qualifications.

Carried without dissent

12.4 **Sharing Mathematics, Alberta Mathematics Dialogue Conferences** – Gary MacGillivray.
Gary sent the following thoughts via email, as he was not able to attend the meeting:
The group needs to have a discussion about what, if anything, to do with Sharing Math. Options include keeping it as a stand-alone, trying to combine with the Alberta Math Dialogue, and rolling it into the BCCUPMS meeting. There may be other options too. Gary has found that keeping it as a stand-alone has a few issues. Attendance is low, maybe a dozen each time after the first year. It is not so easy to find speakers who want to talk about course-oriented initiatives as distinct from outreach. It competes with Changing the Culture in focus, and for speakers.
Combining with AMD would also have problems. The AMD is an "Alberta Math Conference" at which there are some education sessions, and what makes AMD work is the participation of the big universities. The education landscape in BC is somewhat different. We have many more institutions, and the big universities do not participate in a Provincial conference that is about research and education. It is also very unlikely that the Albertans would want AMD to be held outside of Alberta, as it provides regional opportunities for their students.
Gary suggested to make educational presentations an integral part of articulation by incorporating 4 or 5 throughout the meeting. Two could replace the plenary, and the others could fill in any gaps in the agenda. If in some year there are pressing topics that need the group's attention, then we could have fewer presentations. This meeting is about curriculum and education, so the "sharing-math" topics are, in Gary's opinion, what we should be talking about and thinking about.
Jim Bailey said that he does not think there is much that could be cut from the agenda. Perhaps this is a movement to bring back the keynote speaker. Deanna Baxter mentioned that there used to be a third ProD day and that it was replaced by Sharing Math in memory of Jim Totten. She is in favour of two days of articulation, followed by one ProD day which could continue to be Sharing Math. Alternately, Sharing Math types of topics could be integrated into the Articulation meeting, but then it would not be possible to keep things to two days only.
Suzanne Feldberg suggested that participation this year was of course low due to the remote location, but when the Articulation meeting is held on the Mainland then participation should be higher. She suggested we could hold Sharing Math only every second year.

Action item: Deanna Baxter volunteered to organize Sharing Math at Capilano next year. The theme will be outreach.

12.5 **Online formative assessment.** Who is using:

- Lyryx Learning
- Maple TA

Not discussed.

13. **Committee business:** 16:00

13.1 **Core Calculus Report.**
The CCR must be reviewed every five years; this was last done in 2013.
Formation of a subcommittee: Wayne Nagata, Justin Gray, Michael Nyenhuis, Ian Affleck, Kiera Gunn, and Ana Culibrk volunteered.

13.2 **Mathematics Flexible Pre-Major Report**
Please see the report that Gary MacGillivray sent to the listserv on May 15th, also on page 32.
It has been suggested that we put this information on our web page, in which case we need a procedure in place to keep it current. Gary MacGillivray suggests that we provide the core information on the web page, along the lines of "most programs require most of these courses, and some others", and then provide links to the actual institutions' information. If those links are generic enough, they will not need to be updated every year.

13.3 **BCcupms: Webmaster's Report.** – Stephen Benecke (in absentia)
At the 2015 meeting, I was elected as the new webmaster. In general, only minor updates to the website occurred in the last year.
Many members have checked the information of their institution pages and those updates have been made. If you find any inaccurate information or updates, please let me know. Any suggestions on how to improve the site are always welcome as well.
I value the opportunity to contribute to the BCCUPMS and will strive to maintain and improve the website as needed. If you have any questions or concerns, please don't hesitate to let me know.

13.4 **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 Jane Butterfield accepted the nomination for Secretary of the BCcupms.

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

13.5 **Debriefing: was this joint meeting worthwhile? should we do it again?**
David McNeilly says it has been a learning experience, and it is interesting to see what is happening in British Columbia. It is difficult for members of ACAT to travel to both the AMD and to the ACAT, which is a problem for them with participation. It is not very likely that ACAT members would travel to BC. We probably should hold a joint meeting again, every four or five years.
Julie Peschke is on both committees because of historical reasons. A joint meeting every so often is beneficial, but it should alternate which province hosts. Communication between the two bodies is very important.
Claude Laflamme suggests that every year an Alberta member attends the BCCUPMS meeting.
Deanna Baxter suggests we invite ACAT members to attend BCCUPMS meetings at their own discretion.

13.6 **Theme for our 96th meeting.**
Jim Bailey: group exams (two-stage exams) and assignments.
Please email Jim Bailey with any other suggestions if they occur to you.

13.7 **Date and location of the 96th meeting of the BCcupms: May 15–17, 2018 at Capilano University.**

13.8 **Proposed future dates for BCcupms meetings:**

Year	Meeting Dates	Location
2018	May 15–17	Capilano University
2019	May 14–16	
2020	May 12–14	Trinity Western University

13.9 **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 web master, Stephen Benecke.

14. Adjournment.
The meeting adjourned at 4:25pm
(Moved by Rick Sutcliffe and seconded by Natasha Davidson)

Many thanks to Robert Woodrow, Melissa Wrubleski, and University of Calgary for their excellent work in hosting us for this meeting.

List of Committee members Present

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

ACAT Mathematics and Statistics Articulation Committee

Name	Affiliation	TUE	WED	MATH	STAT
Clare Ard	ACAT	x			
Julie Peschke	Athabasca University	x	x		x
Andreas Guelzow	Concordia University of Edmonton	x			
Matthew Morin	Keyano College	x			
Sunil Barran	MacEwan University	x			
Roberta La Haye	Mount Royal University		x	x	
Alex Ondrus	Northern Alberta Institute of Technology	x			
Roberto Bencivenga	Red Deer College	x	x	x	
David McNeilly	University of Alberta	x	x	x	
Claude Laflamme	University of Calgary	x	x	x	
Robert Woodrow	University of Calgary	a.m.	a.m.	x	

BCCUPMS

Name	Affiliation	TUE	WED	MATH	STAT
Joyce Kwan	Acsenda School of Management	x	x		x
Keira Gunn	Alexander College	x	x	x	
Julie Peschke	Athabasca University	x	x		x
Deanna Brajcich	BCAMT	a.m.			
John FitzGibbon	BCCAT	x			
Simin Jolfaee	British Columbia Institute of Technology	x	x		x
Winona Cordua-von Specht	British Columbia Institute of Technology	x	x	x	
Patrick Montgomery	Camosun College	x	x	x	
Susan Chen	Camosun College	x	x		x
Leo Neufeld	Camosun College (retired)	x	x	x	
Deanna Baxter	Capilano University	x	x	x	
Mahshid Atapour	Capilano University	x	x		x
Tracy Wall	CNC - Prince George	x	x	x	
Jim Bailey	College of the Rockies	x	x	x	
Ana Culibrk	Columbia College	x	x	x	
Gera Belchev	Coquitlam College	x	x	x	
Natasha Davidson	Douglas College	x	x	x	
Michael Nyenhuis	Kwantlen Polytechnic University	x	x	x	
Eugene Belchev	Langara College	x	x	x	
Kevin Craib	Langara College	x	x		x
Jeannie Cameron	North Island College	x	x		x
Hongbin Cui	Northern Lights College	x	x	x	
Erfan Zahrai	Northwest Community College	x	x	x	

BCCUPMS, cont.

Jason Schaad	Okanagan College	x			
David Leeming	PIMS - UVic	x	x	x	
Doug Henderson	Selkirk College	x	x	x	
Justin Gray	Simon Fraser University	x	x	x	
Susan Oesterle	SLP/Douglas College	x	x	x	
Shane Rollans	Thompson Rivers University	x	x		x
Suzanne Feldberg	Thompson Rivers University	x	x	x	
Rick Sutcliffe	Trinity Western University	x	x	x	
Jason Loeppky	UBC Okanagan	x	x		x
Wayne Broughton	UBC Okanagan		x	x	
Bruce Dunham	UBC Vancouver	x	x		x
Wayne Nagata	UBC Vancouver	x	x	x	
Erin Beveridge	University of Northern British Columbia	x	x	x	
Ian Affleck	University of the Fraser Valley	x	x	x	
Jane Butterfield	University of Victoria	x	x	x	
Costa Karavas	Vancouver Community College	x	x	x	
Gabriela Kakushkin	Vancouver Community College	x	x		x
Cobus Swarts	Vancouver Island College	x	x	x	
Jaclyn Semple	Yukon College	x	x	x	

Supplemental Reports

PIMS Report

Introduction
The Pacific Institute for the Mathematical Sciences (PIMS) received a renewal on its funding from NSERC for the period 2014 to 2019. The current Director of PIMS is James Colliander, Professor of Mathematics at UBC. Former PIMS Director Alejandro Adem was a great supporter of PIMS initiatives in math outreach and is responsible for the current model for the PIMS Education Associates. Currently, there are twelve Associates in BC and four in Alberta. We would welcome more Associates – and would encourage anyone interested to speak to me during the Meetings. There is no annual fee or three-year limit. The PIMS Education Associate agreement with PIMS remains until one party terminates.

PIMS Education Associates in Alberta
Concordia University of Edmonton, MacEwan University, Mount Royal University, Red Deer College.

PIMS Education Associates in British Columbia:
Camosun College, Capilano University, College of the Rockies, Douglas College, Langara College, Okanagan College, North Island College, College of New Caledonia, Selkirk College, Thompson Rivers University, University of the Fraser Valley, Vancouver Island University.

Reports from the Alberta PIMS Education Associates

Mount Royal University
Explore IT is a fun, engaging, and hands-on opportunity for grade nine girls to explore potential opportunities in information and communications technologies, as well as science, engineering and mathematics related career paths. Held at three of Calgary's premier post-secondary institutions – the University of Calgary, Mount Royal University, and SAIT Polytechnic – the participants are educated and entertained by a variety of hands-on and highly interactive workshops, as well as an inspiring keynote speech presented by a successful woman from the STEM sector.
Over seven hundred girls from Calgary and beyond are expected to attend the event on May 10, 2017. MRU presented eleven workshops, each covering one of the STEM themes. SAIT and the University of Calgary also presented workshops.
The Calgary Elementary School Mathematics Contest.
The sixth annual contest took place on April 26, 2017. It is designed for grade 4, 5 (Level 1) and grade 6 students (Level 2). There are 20 questions from easy to difficult. Students select one of four possible answers. The goal of the contest is to encourage interest in mathematics and to ensure that the students enjoy and benefit from the experience. Therefore, the contest is not an exam and no grades are given. Three elementary schools in Calgary participated in the Contest.
Math Kangaroo.
This year (March 27, 2017) there were over 400 contestants in three different locations in Calgary, one of them being Mount Royal University. Training sessions are held (January-March) at two of the locations. There were a number of national winners from Calgary this year. Students from grades 1-12 participated in MK, the largest cohort being from grades 3 and 4, with 63 and 68 students, respectively.

Concordia University of Edmonton
Math Kangaroo
This competition is one of the largest in the world attracting over six million students and hundreds of mathematicians from more than 60 countries. The main purpose of the Math Kangaroo competition is to dispel the myth that mathematics is boring by creating a positive environment with fun events that emphasize the practical nature of mathematics. Problems are created to be attractive, entertaining and appealing to the students; nevertheless, they are rich in math content and provoke exploration of novel ideas and approach.
Math Kangaroo Clubs
Concordia organized mathematics enrichment classes for Grades 1-9 students to prepare them for national and international

competitions such as the Canadian Math Kangaroo Contest. The purpose of the classes is to meet the educational needs of students who require math challenges beyond the regular school curriculum. Approximately 100 students took part in the Clubs (held at Concordia and at MacEwan University)

Math Kangaroo Contest

On March 26, Concordia University of Edmonton welcomed 255 students in grades 1 through 12 from Edmonton area who participated in the international Mathematical Kangaroo contest-game. Last year MacEwan University opened doors for the Math Kangaroo participants. In 2017, 104 students also participated in Math Kangaroo at the MacEwan University location. Concordia University of Edmonton and MacEwan University work very closely in running the contest.

MacEwan University
No report

Red Deer College
No report

Reports from British Columbia PIMS Education Associates

Camosun College
Camosun helped support Math Challengers on Feb 17, 2017, a well-established annual competition for local schools. Fifty-six grade 8 and 9 students participated in BCMC this year. It was supported by 7 department members for the afternoon at Camosun's Interurban Campus. Also helping out were a number of retired teachers and UVic faculty. This was an exciting and fun event for the students and faculty involved. PIMS UVic provided the medals – now called the PIMS medals.
A new activity started this year focussed on conducting math workshops at the Grade 7/8 level, an age group that doesn't traditionally see much support from the PSE math sector. Three workshops were conducted at local middle school with a class of approximately 20 students. The final one was on April 28, 2017.
There was a dual focus to the workshops: to support the school in preparation for the Gauss math contest, and energize students about mathematics in general through hands-on activities. No funding from PIMS was provided, as all of the activities were low-cost and created through existing departmental supplies, although future ideas have been identified which would require some funding to support.

Capilano University
Capilano U. did two SNAP Math Fairs where they invited 6 classes of grades 4-5 students, so a total of 12 classes, put on by the Math for Elementary Teachers students. They also hosted the BC High School Math Contest in March. Capilano U. celebrated Pi Day (March 14) with pizza, games and door prizes in their Math Learning Centre.

College of New Caledonia
No report

College of the Rockies
COTR hosted the BC High School Math Contest in May.

Douglas College
Douglas College faculty and students put on a Math Mania event at Ecole Porter Elementary School on November 16, 2016. We had just over 100 students and parents participate and just under 20 volunteers. The children had a great time and greeted the mathematics with enthusiasm and success – their positive response to interesting and challenging mathematical ideas illuminated the possibilities of an engaged and serious mathematics program for our Mathematics for Teachers students – it really transformed many of them in terms of views on mathematics, what it can look like and what learning it can be like.
Douglas College held the BC High School Math Contest final round for both junior and senior groups on May 5, 2017. There were a total of 143 participants for the preliminary round and 22 participants for the final round. There were 12 students writing the junior final round and 10 writing the senior final round. After the contest students gathered to have lunch and engage in group challenges – they reported that they enjoyed these group challenges the best of all the challenges they had

had that day.

Langara College
During the fall 2016 and also spring 2017 our Math 1190 (MFEE) course held their MATH FAIR. Each time it was a 2 hour long poster session in the lobby near our main entrance into the college. It was advertised on Social Media, but mainly Langara students attended. Note: international students, whose numbers at Langara increased rapidly, are really amazing and very willing to participate in solving math and logic puzzles. It is a real pleasure to always have a crowd near the booths. Langara hosted the American Math Contest (AMC 8, AMC 10/12 a, b) – together in all the rounds close to 100 students. They hosted the BC Secondary Math Contest on May 5, 2017 – 50 students participated.
March 3, 2017 – Langara College hosted the regional Science Fair. There are two breakout sessions with the Science Fair and each science department is hosting 20 - 40 students with some entertainment.
We were building Hexastix http://www.georgehart.com/sculpture/pencils.html with 57 students. This was our second attempt – and this time it was really very successful. We learned this amazing project during the Sharing Math Conference a couple of years ago in Kwantlen (Richmond) presented by Veso Jungic, and in the name of Sharing Mathematics we took it further.

North Island College
North Island College hosted the final round of the BC High School Math Contest on May 5. We have had some interest from School District 71 in helping to plan events, which is excellent – they certainly see the value in these kinds of events.

Okanagan College
BC High School Math Contest: This was held on Friday, May 6, 2016 - 78 students from 14 schools participated
Math Challengers: The Okanagan region MC was held on Feb. 17, 2017 - about 50 grade 8 & 9 students participated.
Math Fair: held on Mar. 16, 2017 - about 50 grade 6 & 7 students participated. The teachers enjoyed it very much and our students donated their work. The next day, the participants hosted their own math fair at their school.
Spring into Math: Math 160 (Math for Elementary Teachers) students together with the Aboriginal Centre, campus librarian, and ENACTUS students created 10 stations - about 120 grade 3-5 students participated.
Experience OC: This event was held at the Kelowna campus. About 30-40 grade 11 & 12 students participated. The Aboriginal Centre hosted a similar event at the Penticton campus. About 30 grade 5-8 students participated.
Kangaroo Math Contest: Okanagan College was involved in a Kangaroo Math Contest jointly with UBCO. It was held on Mar. 26 at UBCO. Okanagan College may host it next year. The PIMS Education Fund supported both Math Challengers and Math Fair.

Selkirk College
Selkirk College did not do any specific Math outreach in the past year. However, in a broader context of encouraging students to study science, we hosted Quantum Leaps conference This event introduces high school girls to female professionals in education, science and engineering fields and gives the girls an idea of the opportunities that await them (as well as the work required to get there). Typically, this event attracts about 100 girls.

Thompson Rivers University
BC High Schools Math Contest. Several TRU faculty members helped to organize this event. TRU hosted the regional final round.
School District #73 Math Challenge. This math contest for ages 10-12 is an annual event hosted at TRU. The contest itself is organized by district staff. Several TRU faculty hosted four 30-minute math enrichment activities as part of the event.
School visits. In the fall several 1-hour math enrichment sessions were held in classrooms (grades 2-4) at a French Immersion school.
Day of Arts & Science. A full-day event where high school students attend TRU for the day and attend "university classes" on topics of interest. This included a 1-hr session on fractal geometry.
Regional Science Fair. The annual regional science fair is hosted at TRU. This year it included a series of math puzzles & games sessions for students participating in the science fair.

Family Night of Science. A biennial open-house night hosted at TRU and open to the public. Faculty members from Math-Stats hosted a math puzzles & games session.

University of the Fraser Valley

BC Math Challengers: This was UFV's fourth year hosting Fraser Valley Regionals of Math Challengers. We had 90 contestants attending from 7 schools.

BC Secondary School Math Competition: This is UFV's twentieth year hosting the BCSSMC. We expect 124 contestants attending from 17 schools. Our afternoon enrichment activity session will involve Graph Theory puzzles.

Science Rocks!: This is UFV's ninth summer hosting Science Rocks!, a series of one-week, full-day science and physical activity camps in July and August. For the first time since the inaugural year, we have a designated Math Week. (http://www.ufv.ca/faculty_of_science/science-in-the-community/science-rocks/)

Math Mania: I have included a chart below showing the 3 events for this school year. Pictures for the events can be seen at https://mathmania2010.shutterfly.com/ Sandy Hill Elementary (Abbotsford, BC) Oct, 5, 2016 35 vols. Yarrow Community School (Yarrow, BC) Feb 1, 2017 29 vols. Chilliwack Adventist Christian School (Chilliwack, BC)** May 17, 2017 TBA ** The May 17, 2017 event will be a shared event involving the hosting school and the Fraser Valley Home School Group.

Vancouver Island University

VIU hosted the annual Secondary School Math Contest – May 5, 2017.

Thank you:

Thank you to those PIMS Education Associates who are taking the time to do Math outreach – whether or not PIMS provides financial support. Also, thanks to the following individuals who contributed to the writing of this Report: Rossitza Marinova (Concordia University of Edmonton), Indy Lagu, Mariya Svishchuk and Shawn Liu (Mount Royal University). Patrick Montgomery and Chris Odgers (Camosun College), Deanna Baxter (Capilano), Jim Bailey (COTR), Natasha Davidson (Douglas), Nora Franzova (Langara), Jason Diemer (North Island College), Satoshi Tomoda (Okanagan), Doug Henderson (Selkirk College), Richard Taylor (TRU), Ian Affleck (UFV) and David Bigelow (VIU).

Report on the Flexible Pre-Major Review done in 2015

At the 2015 meeting of the BCCUPMS, the five signatories agreed to review the "Flexible Pre-Major", which is really just a list of curses that are required at institutions with a Mathematics program. The last report on the Flexible Pre-Major was approved in 2011.

This document summarizes the outcome of the 2015 review. Each institution was asked to review the Flexible Pre-Major as it pertains to themselves, and report the findings back. At the 2016 BCCUPMS meeting the signatories recommended no changes to core of the Flexible Pre-Major. The recommendation was adopted.

The Flexible Pre-Major has a fairly well-defined core. Each institution that offers a Major program in Mathematics requires the core courses, with the possible exception of up to two courses (SFU,TRU, UFV, UBC-Vancouver, UVic), and the requirement of some additional courses (except for TWU). University-level requirements like English or additional Science courses are not reflected in this report.

The **core Math and Computer Science courses in the Flexible Pre-Major** are unchanged from 2011.

- Calculus I, II, III
- Linear Algebra
- Discrete Mathematics I
- Ordinary Differential Equations
- Computer Science I, II

The following **changes** are reflected in the listing below.

- There is a new Mathematics program at **KPU**.
- **UVic** has changed their program requirements.
- **TRU** has not changed their requirements, but the entry below corrects a minor omission in the 2011 report.
- The entry for **UBC-Vancouver** has been updated to reflect that Discrete Mathematics I has never been a requirement.

Requirements of the Major programs in Mathematics currently offered are:

- **KPU**. Core, plus Discrete Math II (2410) and Mathematical Statistics (2315).
- **SFU**. Core except Ordinary Differential Equations (see note below), plus Introduction to Analysis (242), Discrete Mathematics II (MACM 201), Statistics I, (270), Computing with Algebra (203), Computing with Calculus (204).
- **TRU**. Core except Ordinary Differential Equations (as students can choose Statistics I instead), plus Introduction to Analysis (2200), Discrete Mathematics II (2700), and one of Statistics I (Stat 2000), Differential Equations I (2240).
- **TWU**. Core only.
- **UBC-Vancouver**. Core, except Discrete Mathematics I, plus Mathematical Proof (220). (See note about Computer Science).
- **UBC-Okanagan**. Core plus Mathematical Proof (220), and Statistics I (230).
- **UFV**. Core except Discrete Mathematics I and Computer Science II, plus Statistics I (270), and Transition to Advanced Mathematics (265).
- **UNBC**. Core, plus Introduction to Complex Analysis (201) and Foundations of Modern Mathematics (224).
- **UVic**. Core except Discrete Mathematics I and Computer Science II, plus Logic and Foundations (122), Abstract Algebra (212), Discrete Mathematics II (222), Introduction to Real Analysis (236), Computer Assisted Mathematics and Physics (248), Statistics 1 (260).

Course equivalencies are listed in the BC transfer guide, www.bctransferguide.ca. The following items are noted.

- Students at **SFU** must take one of Ordinary Differential Equations (310) and Numerical Analysis (MACM 316). These are used to satisfy upper-level requirements in the degree.
- It should be carefully checked whether Computer Science courses transfer to **UBC-Vancouver** – transfer credit is hard to get for UBC CPSC 110 or 210 or MATH 210, which form the computing prerequisites for a B.Sc. in Mathematics at UBC.
- **UVic** Logic and Foundations is an "Introduction to proofs" class. Sometimes Discrete Mathematics I courses receive transfer credit. Additionally, UVic Math 204 is Calculus IV. It includes a substantial amount of Ordinary Differential Equations. Students who transfer with Ordinary Differential Equations instead should experience no difficulties; many Ordinary Differential Equations courses transfer to UVic as 204.

We suggest that the lists of core courses, and current Mathematics programs and requirements be posted separately on the BCCUPMS website, and updated annually.

The Flexible Pre-Major Review Subcommittee,
Nora Franzova (Langara)
Justin Gray (SFU)
Gary MacGillivray (UVic)
Michael Nyenhuis (KPU)
Wayne Nagata (UBC)

Minutes of the Statistics Subcommittee

MINUTES OF THE STATISTICS SUBCOMMITTEE
95TH BCCUPMS MEETING, MAY 16 - 17, 2017
University of Calgary
Wednesday, May 17th, 2017

Present: Mahshid Atapour (Capilano U), Jeannie Cameron (North Island College), Susan Chen (Camosun College), Kevin Craib (Langara C), Bruce Dunham (UBC - V), Simin Jolfaee (BCIT), Gabriela Kakushkin (VCC), Joyce Kwan (Ascenda School of Management), Jason Loeppky (UBC - O), Julie Peschke (Athabasca), Shane Rollans (TRU)
Apologies for absence received from Jinko Graham (SFU)
Chair: Bruce Dunham
Acting Secretary: Susan Chen

1. **Approval of agenda**

   Motion to approve agenda: Kevin Craib; seconded: Jason Loeppky. **Carried unanimously.**

2. **Approval of the minutes of the Statistics Subcommittee Session of the 94th meeting.**

   A number of minor errors were noticed in the minutes circulated. In particular, under item 4: the subheading "Acsenda" should be changed to "Acsenda School of Management", the last line of the institutional report of Langara College contains two commas that should be removed, and the subheading "Victoria Island University" should read "Vancouver Island University". Under item 8 (Proposed new grade 12 course) the statement "and will be available to any student with Foundations and Principles of Math 10" should be removed because STAT 12 will not have any formal prerequisite. The chair proposed to correct these errors and moved the motion to approve the modified minutes.

   Motion to approve minutes: Kevin Craib; seconded: Gabriela Kakushkin. **Carried unanimously.**

3. **Matters arising from the minutes.**

   In following up on the brief discussions on the proposed new STAT 12 course, the Chair commented that the proposed STAT 12 curriculum looks more like an undergraduate intro statistics course instead of a high school statistics course, and it appears to be too mathematical. He invited everyone to review the proposed curriculum and send him any comments. The Chair hopes to be invited to attend the BCAMT professional development meeting in the fall to offer our willingness to assist teachers who will be teaching statistics at high school.

   The Chair described the possibility of developing a set of resources for training high school teachers to teach STAT 12, so that instructors will be able to draw from the resources to conduct training sessions without having to develop their own workshop materials. Further discussion of this topic was deferred to agenda item 6.

4. **Institutional reports.**

   The issue of course articulation was discussed when institutional reports were shared, in part prompted by an issue of unqualified instructors raised at the main meeting. There was a general agreement that courses that are not labelled as MATH or STAT should normally be directed to another appropriate department or subject area for credit transfer evaluation. For example, a PSYC xxx course should usually be directed to a psychology department for credit transfer when applicable. Qualifications of instructors should also be considered when assessing course credit transfer.

Acsenda School of Management

There has been a major change in the grade allocations in the introductory Statistics course, Fundamentals of Economic and Business Statistics (BADM 221), starting in January 2017. The midterm and final exams together now weigh 70% of the total grade, which is matching the requirement for the Quantitative Methods in the articulation with the Chartered Professional Accountants (CPA).

The school has also implemented the course contents in BADM 221. This course includes the elementary and intermediate levels of Statistics, and now also includes the hypothesis testing about the population proportion for one- and two-samples and introduces goodness-of-fit tests, whereas only the hypothesis testing about the population mean was discussed in the past. The introduction of ANOVA may also be included when time is permits. The follow-up courses, Management Science (BADM 222) and Operations Management (BADM 202) include topics such as linear and multiple regression, time series and forecasting, quality control, and decision analysis. Excel and a calculator are used in BADM 221, and Excel only in BADM 202 and BADM 222.

The enrollments in BADM 221 are steady, keeping the class size between 15 to 20 per term. The class size of BADM 202 is about 20-27 per term. Both courses are offered four terms in a year. In BADM 222 it is about 11 students per class. This course is offered one or two terms in a year.

British Columbia Institute of Technology

The Mathematics department at BCIT teaches about 20 statistics courses but some programs run their own statistics courses. A new upper level statistics course is developed for the new Applied Data Science part time certificate. There are a couple of intermediate-level statistics courses, but most of BCIT statistics courses are introductory statistics.

R, Excel, and Minitab are all used on courses although over the last two years there have been moves toward using R in the classroom.

Camosun College

There were no curriculum changes in university transferable statistics courses this year. For the first time in a long time, a section of Stat 216 (Applied Statistics) was offered in the summer of 2016 and the section was filled; another section of Stat 216 is to be offered this summer and it is waitlisted. Due to high demand, a section of Stat 116 (Elementary Statistics) is offered this summer for the first time and the class is waitlisted. From September 2016 to April 2017, the enrolments in Stat 116 and Stat 216 were slightly up but remained at the same number of sections as the previous year. The enrolment in Stat 218 (Introduction to Probability and Statistics 1) stayed at the same level as the year before, but the enrolment in Stat 219 (Introduction to Probability and Statistics 2) was doubled.

WeBWorK is used in some sections of Stat 116 and Stat 216 while ConnectMath (from McGraw Hill) is used in other sections. Some students who look for extra materials to study and practice really like the SmartBook (adaptive learning) feature in ConnectMath. There has been continued use of R for the bi-weekly computer labs of Stat 216, 218 and 219, and MegaStat add-ins for Excel for Stat 116 computer labs. Stat 254, part of the Engineering Bridge programs to UVic and UBC, has just received individual transfer credit to UBC-V STAT 241/251 and UBC-O STAT 230.

Susan Chen and Susan Kinniburgh conducted a controlled crossover experiment on two-stage exams in Stat 116 last fall. It came as some surprise to find two-stage exams not only turned exams into positive collaborative learning experiences, but also made students happier to write exams (on late Friday afternoons!) in a course that many preferred not have to take. There are plans to run two-stage midterms in future classes of Stat 116.

Capilano University

The two statistics courses MATH 101 and MATH 205 have been relabeled as STAT 101 and STAT 205 respectively. A new third year Statistics course STAT 301 has been developed. This course will be offered for the first time in fall 2017 and in particular expects enrollment from the Liberal Studies Bachelor of Arts students. The course will have a weekly

computer lab component where Excel and R will be used for analysis. Lessons learned from delivering this course will be used (in the future years) to add computer lab sessions and replace the use of calculators with Excel and/or R for the first and second year statistics courses.

A group project component was added to both first year and second year statistics courses in fall 2016 and spring 2017. The students had to choose a topic, collect data, use a list of statistical methodologies, prepare a final presentation file (based on the results), and give a five minute oral presentation. It was accounted as 5% of their final grade. The project seemed to trigger the students' curiosity and facilitate their overall learning of statistics.

Langara College

In 2017, Langara's enrolment in statistics courses was 2,329 students (1,532 domestic = 66%, 797 international = 34%). Introductory courses STAT 1123 (Basic Probability and Statistics for Business), STAT 1124 (Statistical Methods I), STAT 1181 (Descriptive and Elementary Inferential Statistics), and STAT 4800 (Business Statistics) continue to exhibit the largest enrolments. The statistics area is currently developing a post degree diploma program in data analytics and a third-year course for an undergraduate degree in bioinformatics at Langara. Alternative statistical software packages for use in introductory and intermediate level courses are being considered, including SAS, SPSS, MINITAB, and R. Statgraphics (version 16) and Excel are currently used. There will likely be hires of one or two part-time statistics instructors during the next six months.

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 Math 115 with three at the Courtenay campus and one at the Campbell River campus as well as a distance option offered in the Fall and Winter terms. There is no lab attached to the course. Students use technology via online applets. The textbook changed this year to Deveaux *et al.* Stats: Data and Models, Second Canadian Edition (2nd Edition). In the future, the course will be reviewed and rearticulated if needed based on the introductory statistics transfer credit proposal.

Simon Fraser University

Undergraduate enrollments: SFU Statistics and Actuarial Science experienced about a 5% decline in undergraduate enrollment in academic year 2015-16. Part of this decline is due to a 20% drop in enrollment in our STAT 270 as a result of Engineering Science (ENSC) and Mechatronics Systems Engineering (MSE) replacing STAT 270 with their own lower-division Statistics courses, ENSC 280 and MSE 210. Sociology and Anthropology moved to drop the service course STAT 203, but enrollments in the course are down only slightly. By contrast, enrollments in service course STAT 201 are down by about a third. Health Sciences students seem to prefer STAT 203 over 201 because of a lower content in mathematics. Despite a small enrollment decline last year, this spring 2017, undergraduate enrollment reached a high of 2211 students. Increased enrollments in spring semester 2017 are expected to offset lower summer enrollments in STAT 270 and 201. We started introducing new courses for our minor program in in 2012; however, our new minor came into effect in the Spring of 2013. After an initial increase from 2013-2015, enrollments in our minors courses have levelled out.

Undergraduate program changes: Moves are continuing to eliminate restrictions that prevented students who had taken statistics in other departments from taking courses from the department. For example, it is now allowed for STAT 100 to be taken after other STAT courses. There is now a route to the minor program with weaker mathematics requirements. At the same time, there has been an increase in the minimum statistics requirement of the minor program from 7 to 11 units of upper-division credit. Both major and honours programs have, until now, required a minor in another discipline but this has been weakened to allow either a minor or any 12 upper-division units completed using courses outside of MATH, ACMA, and MACM.

Two new lower-division courses were launched, STAT 180 and 240. STAT 180 is a one-credit, seminar course on career development that brings in speakers from industry. STAT 240 is Introduction to Data Science and is designed to get lower-division, statistics honours, major, and minor students to see real data earlier. Also launched is an upper-division, capstone course in big data for major and honours students, STAT 440. This hands-on course will be taught again in 2017-18 and both STAT 240 and 440 will be offered annually. New courses will continue to be refined. A new upper-division course for honours, major, and minor students on statistical learning, STAT 452, will be offered annually starting in Fall, 2017.

Faculty news: In September 2017, Luke Bornn will be away on a three-year leave of absence to take up an opportunity in the sports industry. The department is pleased to welcome Dr. Harsha Perera as a new lecturer in the fall.

Thompson Rivers University

Last summer the School of Tourism changed their program to require the statistics course taught by the Geography Department rather than the course offered by the Department of Mathematics and Statistics. The department fought the decision but lost other than ensuring that the original course will still be acceptable as a substitute. So far there has been little effect as the section of the STAT course that was dedicated to Tourism students was still full of Tourism students.

The proposed Masters of Science in Data Science is progressing and the department are currently advertising for a tenure track position to help support this degree.

Peter Moyls, a faculty member who was half time in the department and who taught introductory statistics retired at Christmas. The tenure track position is also to help replace him.

Bruce Crofoot is the new chair of the Department of Mathematics and Statistics. Richard Taylor will continue as program coordinator. Suzanne Feldberg will be the acting program coordinator while he is on sabbatical. The numbers in all statistics courses remain stable.

University of British Columbia, Okanagan

Statistics at UBC Okanagan Campus has undergone significant changes to the entire curriculum at the 3rd and 4th year level. In addition, several STAT courses have been renamed as DATA courses. The UBC Okanagan website gives detailed information on the changes. A new minor in Data Science and a B.Sc. Major in Data Science have been successfully launched and a Data Science stream has been added to an M.Sc. in Computer Science. The first year and second year courses have all remained the same. R (RStudio) is used exclusively in all STAT and DATA (taught by a statistician) courses. The OpenIntro text has been used for STAT 121 and STAT 124.

University of British Columbia, Vancouver

Numbers on the Statistics program continued to rise over the past year with a total of 54 students graduating since May 2016, this being a record high. Demand for STAT courses also exceeded previous years. For the first time the department has been obliged to cap the number of students entering our specialisations, the limit to entry being about ninety per year. Some students appear to be looking to enter Statistics and Computer Science programs via the Mathematical Sciences specialisation, which will be incorporated into the capping in future years.

Proposed changes to credit exclusions for STAT 200/241/251/302 described in last year's report did not move forward this year. The intention is to initiate these changes next year. The department is exploring creating a new data science course, probably in a joint venture with Computer Science. It is possible the new course will be at first-year level with little or no pre-requisites.

The new Master of Data Science (MDS) program runs out its first cohort this summer. There is high demand for the second run, which is expected to recruit around fifty students to commence in the fall.

The Flexible Learning project, funded by UBC's Teaching and Learning Enhancement fund, has continued developing and testing applets, videos, in-class activities, and WeBWorK questions for introductory courses. All resources created will be open-source and made freely available via a new website, StatSpace.

In faculty news, Marie Auger-Méthé joins the department from Dalhousie in September, a joint appointment with The Institute for the Oceans and Fisheries. Hiring is on-going for an new instructor position linked to the MDS program, and at least one sessional lecturer post. It is expected that further new faculty positions will open in the coming academic year. Harry Joe has been awarded the Statistical Society of Canada's Gold Medal, the highest research honour the society bestows.

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

Vancouver Community College

Statistics courses: 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 core-requisite. Articulation transfer requests have been initiated through BCCAT with BC institutions.

Enrolment: 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 newly developed Environmental Studies (three concentrations) first-year transfer certificate includes the Introduction to Statistics course (MATH 1111). It is anticipated that enrolments will slightly increase. The new certificate program is projected to start in September 2017.

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

Vancouver Island University (in absentia)

Statistics offerings at the university have remained the same. Offerings comprise four sections of MATH 161 (Introduction to Statistics for Social Sciences), two sections in each of the Fall and Spring terms (using The Basic Practice of Statistics by Moore for MATH 161 as of last year) and Math 181 (Introduction to Statistics), for the technology programs (Fisheries, Forestry and RMOT). Excel is used in MATH 181. MATH 254 (calculus-based) was offered again last year, and Probability & Statistics for Engineering and the Sciences by Devore adopted as the text. R is used for MATH 254. Both MATH 203 (Biometrics) and MATH 211 (non-calculus based) for science students have remained the same. Four upper level courses have been proposed for the upcoming Math Major. It is planned to use R (and or Excel) for these courses. If the proposed Health Sciences program takes off, the department will be offering MATH 155 (Introductory Statistics for Health Sciences). The software SPSS will be used for this course.

5. **Articulation agreements between Alberta and BC: Introductory Statistics transfer credit proposal**

Prior to the meeting the chair circulated a revised version of the proposal for the content of a generic introductory course put forward by Julie Peschke. The document indicated proposed core and elective topics, with suggestions from several members of the committee incorporated.

The chair clarified what he perceived to be the goals for the discussion and resulting document. It was not the aim to revise or prompt revisits to existing articulation agreements, though any proposal that resulted from the discussion could be used to guide articulation decisions. It was thought useful for the committee to discuss in some depth what is being taught in our introductory classes and why. The proposal prompted such reflections.

The committee discussed the second draft of the Introductory Transfer Credit Proposal item by item. There was a general agreement in the proposed core and elective topics for Intro Stats. Julie will post the third draft, which will

probably be the final draft, on the Stats listserv. Future Intro Stats credit transfer evaluations may be informed by this document. The committee thanked Julie for her efforts on this initiative.

Due to time constraint, the committee only very briefly discussed about the expectations of the depth of coverage of each of the core topics, as proposed by Julie Peschke in the Stats Listserv just prior the meetings using Bloom's taxonomy of critical thinking.

6. **Proposed new grade 12 course**

   A new Statistics course at grade 12 has been proposed by the Ministry of Education, STAT 12. The course will be an elective, and will have no formal prerequisites. The course may be offered starting in the 2018/19 academic year.

   The Chair suggested that STAT 12 is probably more important than some MATH 11/12 courses for many students, especially if they either will not be going to university or will not further study a STEM discipline, but this message may not be well channeled to the students. Further, some teachers may not be prepared to teach the course.

   The view was expressed that the proposed STAT 12 appears too focused on mathematical thinking, and looks much like an intro stats course at undergraduate level. When teaching a high school level stats course, the students could, for example, be asked to do both an observational study and an experiment in their classes to understand the sources of data and concepts of variation, and to get some idea of where statistics can be applied. STAT 12 should prepare students to come into an intro stats course in higher education, but not a replicate such a course that research and experience informs is difficult for most students even at university level.

   The Chair called on statistics instructors to go to schools to do training sessions for teachers on ProD days; to give half-day training sessions, and to discuss the differences between statistical thinking and mathematical thinking.

   A question about availability of teaching training materials and resources was raised at the meeting, and the Chair stated that there will be a set of resources for instructors to use, so that instructors do not have to prepare the teaching materials, but only need to be prepared to go out to teach the teachers.

   The Chair informed the committee that he and the heads of SFU, UBC and BCIT co-authored a letter to the Ministry of Education with suggestions of changes to STAT 12, and had yet to hear any response from the Ministry other than a formal acknowledgment of receipt.

   A member pointed out that we should also promote statistics in elementary teachers who will be the first to introduce some simple statistical concepts to the children.

7. **Provincial Minitab license (Bruce Dunham, UBC)**

   Following up from the item on the previous year's agenda, the Chair informed the committee that the procurement officer for BCNet (who coordinated the provincial Maple license) is now in negotiations for a Minitab provincial license and will meet with representatives on May 18. The Chair will circulate further details when they appear.

8. **Open source textbooks (Claude Laflamme, Calgary).**

   At a previous BCCUPMS meeting Claude Laflamme had presented on his Lyryx project on open source textbooks. Claude was unable to attend this meeting, so there was a short discussion about open source texts in Statistics. Jason Loeppky informed that UBC-O use OpenIntro Statistics 3rd Edition. The chair mentioned a text he was aware of from the SOCR project (http://wiki.stat.ucla.edu/socr/index.php/Probability_and_statistics_EBook), commenting that it is not great, but free. It was noted that University of Toronto has a stats course online with videos, which is open access.

   Julie Peschke informed that for her distance learning students she put together relevant YouTube links in a PDF document. Members recalled the "Against All Odds" videos (David Moore et al.) are also online for free, but the materials are rather old.

9. **Any other business.**

   There was no further business.

10. **Motion to adjourn.**

    Moved: Jason Loeppky, seconded: Susan Chen. **Carried unanimously.**