

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

MINUTES OF THE 94th MEETING, MAY 17th – 18th, 2016

TUESDAY, MAY 17, 2016

1. WELCOME

Dr. Trevor Toone, Principle, Columbia College welcomed the BCcupms to its 94th meeting at Columbia College in Vancouver, BC.

2. ADOPTION OF THE AGENDA FOR THE 94th MEETING OF THE BCcupms

The Agenda for the 94th Meeting was approved by consensus without changes.

3. APPROVAL OF THE MINUTES OF THE 93rd MEETING, HELD AT VANCOUVER ISLAND UNIVERSITY.

Motion: (moved by Wesley Snider and seconded by Richard Lockhart)
That the Minutes of the 93rd Meeting be approved as written.

Carried unanimously.

4. ANNOUNCEMENTS

4.1 Introduction of representatives

4.2 Attendance Lists: Deanna Baxter circulated the attendance lists.

4.3 Announcements from the hosts: Ana Culibrk provided information on internet access and logistics for the meeting.

4.4 Notice of Election: At this meeting, elections for the Chairs of the BCcupms and Statistics Subcommittee will be held. These positions have two-year terms. Deanna Baxter, Nora Franzova, and Natasha Davidson volunteered to form the nominating committee.

4.5 Conferences:

Members brought the following upcoming conferences to the committee's attention.

Susan Oesterle: Canadian Math Education Study group Kingston June 2nd to 7th.

<http://www.cmesg.org/wp-content/uploads/2016/04/CMESG-2016-Program-April-18-2016.pdf>

Justin Gray: SFU hosted the 15th annual symposium on Teaching & Learning at the same time as this meeting, but this symposium does not always conflict with this meeting.

<https://www.sfu.ca/tlc/programming/tlsymposium/2016.html>

5. Business arising from the minutes of the 93rd meeting

5.1 Joint meeting in 2017 at University of Calgary – Jim Bailey

We were turned down by BIRS. Jim Bailey talked with University of Calgary and we are invited there. May 16th – 18th, 2017.

5.2 Review of the Mathematical Flexible Pre-Major – Gary MacGillivray

Gary MacGillivray reported that the review was conducted by a group of five: Nora Franzova, Justin Gray, Gary MacGillivray, Wayne Nagata, and Michael Nyenhuis. They sent out a query to everyone asking for updates, and got a number of responses. Gary summarized the results of this review: there is no reason to change the existing guidelines. Every institution has own variations, so it is not a pre-major but more of an advising tool, and that is unlikely to change. Justin Gray adds: also discussed changing the language a bit in the description to remove the dichotomy between “sending” and “Receiving” institutions – will be reflected in next report.

Lennart Berggren asks: at Alexandra College we are looking into doing something in that line. Am I right in thinking the document is “advisory” rather than “official”? Gary says it is correct that the flexible pre-major has no official status; it is a description of the part that is common to all of the programs.

Action item: Gary will circulate preliminary version of report for comment.

5.3 Webmaster’s Report – Stephen Benecke.

(Jim Bailey presented in Stephen’s absence.)

At the 2015 meeting, I was elected as the new webmaster. In general, only minor updates to the site occurred in 2015/16. The main request that I have to current members is to check the information of their institution and bring any updates to my attention. Many have responded to this request earlier and I am very thankful for that. However, a large portion of the contact information has not been verified and may still be inaccurate.

It is my opinion that the website and member information pages can be improved by adding member photos. The few that I already have (mainly the executive) have been added. For those who have updated their contact information, a photo placeholder currently shows on the member pages. I encourage everyone to email me a portrait photo of the current representative of your institution.

In conclusion, I am proud to be the webmaster for 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.

Leo Neufeld asks whether the website hosting is stable or if there is a chance it will be withdrawn. Ian Affleck, former webmaster, confirms that his contact in Calgary continues to host the website and is working well with Stephen. Currently doesn’t seem a need to change it; very unlikely to suddenly stop hosting it.

6. Institutional reports

ALEXANDER COLLEGE—Lennart Berggren

Our Academic Standards Committee has approved a course in discrete mathematics, MATH 115, and it has been approved for articulation by virtually all colleges and universities in the province. With this we now have all the core math and statistics courses required for a flexible pre-major program in mathematics and we plan to go ahead and offer the pre-major program in accordance with the 2011 BCCUPMS guidelines.

Our mathematics enrolments are growing by leaps and bounds and, if this course has the favorable reception our polls indicated it would, we will be considering adding a second course (MATH 215) in discrete mathematics and an introductory real analysis course. The addition of the latter course would, in particular, enable us to qualify to apply for permission to give an Associate of Arts Diploma in Mathematics.

In addition, once the college has added a second-year lab science courses it will be moving ahead to apply for permission to give an Associate of Science Diploma. We would, of course, then want to add an Introductory Analysis course to allow us to offer a Mathematics Concentration for that Diploma.

The statistical study projected last year on the effects of a workshop on the performance of Math 100 students in subsequent calculus courses has not been done, largely because there are too many uncontrollable variables intervening in such a study.

The instructors tell me, however, that, of students who complete the Math 100 workshops in a timely manner, very few seem to end up below a C in the a subsequent calculus course. Right now, we are working on our initial goal of having students complete the workshops earlier in the semester.

ACSENDIA SCHOOL OF MANAGEMENT—Joyce Kwan

Acsenda School of Management is a private degree granting institution that has offered a Bachelor of Business Administration (BBA) degree since 2004. Renewal of consent for the BBA was granted for another five years in 2014. The BBA has five concentrations: Accounting, Human Resources Management, International Business Management, Marketing Management and General Management.

Acsenda also has consent to offer a new Bachelor of Hospitality Management (BHM) degree. The first students were accepted into this program in April 2016. The BHM is a direct entry four year degree program with an emphasis on the *business* of hospitality management. The program integrates courses from the BBA program with specialized courses in the field designed to prepare graduates for the unique challenges of leadership in the changing hospitality industry. A mandatory for-credit paid

internship occurs halfway through the program providing opportunities for students to gain industry experience outside of their country of residence and bring that experience back to the classroom.

There are currently 186 students at Acsenda most of whom are international students from over 20 different countries. The largest groups of students are from Korea, Latin America (Mexico, Brazil, and others), China 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.

Pending approval from the Ministry of Advanced Education, Acsenda School of Management will transition to new ownership in 2016. International student recruitment will remain the primary focus although due to the global reach of the new ownership group, enrolments are expected to grow dramatically over the next five years. Included in the five year plan is expansion of faculty, staff (student services) and the campus facility.

One of the objectives of the plan, especially in the year ahead, is to expand the number of courses accepted for transfer credit by other institutions. We trust that our continuing participation in the annual BCCAT articulation meetings will result in a better understanding of the quality and comparability of our courses in the different subject areas.

This additional degree program (BHM) and the new ownership potential is expected to increase the enrollment numbers in the math courses: BADM 120 (Business Math), BADM 221 (Fundamentals of Economic and Business Statistics) and BADM 222 (Management Science) since these courses serve as prerequisite for upper-level courses in both the BBA program and the BHM program. With the expected growth in international students, the need to design a “Basic Math” course is also being considered.

In the current term, the syllabus of BADM 221 has been carefully revised to be aligned with the expected core contents and requirements of equivalent courses and/or related courses. The topics covered in this course will be modified so that they match 90% (instead of the previous 76%) of the suggested core topics as identified in the “Introductory Statistics Transfer Credit Proposal” for BCcupms by Julie Peschke, Athabasca University. BADM 221 has a wide application in many courses at Acsenda such as Management Science, Operational Management, Business and Marketing Research, and Project Management.

Acsenda emphasizes “International Thinking and Individual Focus” and this philosophy will definite impact the class sizes to be kept in a typical size of 10 to 30 students in the math courses.

BC INSTITUTE OF TECHNOLOGY—Laura Billing

There have been no changes to BCIT mathematics and statistics course in the past year that would affect articulation agreements. Enrollment is stable.

CAMOSUN COLLEGE—Patrick Montgomery

Program: Course offerings have increased slightly in the past year, with the addition of a few sections over the spring/summer term, participation in South Island Partnership (SIP) program, and opening of the Westshore (Langford) campus. No new courses affecting articulation have been added, although MATH 112 and 113 (Fundamentals of Mathematics I and II) were offered for the final time and will be replaced by MATH 142 and 143 this fall. In addition, MATH 225 (Differential Equations) was renumbered as MATH 226 after some minor changes.

As the Technology programs at our Interurban campus are moving from the quarter (3 month) to the semester (4 month) system, we have also converted the associated service courses in math and statistics to the new calendar system. The new courses will be offered for the first time in Fall 2016, with the existing 174a/174b/175 stream for Electronics replaced by the new 166/168 and the existing 185/187/189 stream for Civil/Mechanical replaced by the new 191/193. As these courses are customized for their programs, they are not intended for articulation, though individual credit has been assigned in the past from a few BC institutions.

Staffing: After 3 years as chair, Susan Chen will be turning over to Patrick Montgomery on June 1st. We have had two retirements this year: Stan Toporowski and Jill Britton, and are pleased to note that both positions have been filled by continuing faculty (Stephen Benecke and Crystal Lomas). Tragically, after retiring last summer, Jill Britton was lost to us on Feb 29th, 2016 after a lifetime of teaching mathematics. She bequeathed an endowment to start the *Jill Britton Elementary Education Mathematics Award* to carry on her passion for inspiring students and teachers. A short article for the Camosun newsletter was written by Leo Neufeld and an abridged version is reproduced here.

In Memory of Jill Britton

It is with profound sadness that we announce the passing on February 29, 2016, of recently retired Mathematics Department member Jill Britton. In 1989, Jill and husband, Walter, came to Victoria from Montreal where both had been teaching at Dawson College. Jill quickly adapted to Camosun and embraced our Math course for prospective elementary school teachers. The students were immediately struck by her positive attitude and her infectious love for mathematics—they rewarded her with diligence and success. Besides teaching full-time, Jill managed to continue presenting at Math conferences, organizing

conferences, and conducting outreach activities, like Science Camps and Kite Workshops. At Open Houses, Jill's myriad innovations were the heart and soul of Mathematics Department displays. Jill particularly treasured the art of M. C. Escher. She managed to include topics on tiling (tessellations) in her courses and always made these a part of her kids' camps. After having taught for 50 years and at age 70, she retired in June 2015. During all those years, Jill's dedication to students and passion for teaching never diminished. She was honoured in ways such as receiving the ACCC Excellence in Teaching award in 2009, students loved her (the longest wait-lists were always for her courses) and colleagues found her easy to work with. Jill was an utterly genuine, unwaveringly trustworthy and selflessly giving person. It is very seldom that her kind appears and she will be sorely missed.

CAPILANO UNIVERSITY—Deanna Baxter

Credit and contact hours for Math 152 (Linear Algebra and Differential Equations) and Math 190 (Mathematics for Elementary Teachers) have been increased. Both of these courses will now be worth 4 credits and will have 5.5 contact hours per week which includes one hour of online activities. Content has remained the same but students will have more contact time with their instructors and classmates.

Enrollment statistics are steady compared to the previous academic year with increased enrollment in Calculus I and Introduction to Statistics and decreased enrollment in Precalculus. Many students taking the science calculus stream are interested in eventually entering an engineering program.

A long time faculty member, Julie Johnston, is retiring as of August 2016 and as a result, we have hired a new full time faculty member with a background in Statistics and Applied Mathematics.

COLLEGE OF NEW CALEDONIA—Tracy Wall

No new courses or course changes which ramify on articulation agreements.

No personnel changes in the department.

Since about six months, Jay Notay is the new Vice-President Academic

COLLEGE OF THE ROCKIES—Jim Bailey

Enrolment at College of the Rockies is stable but low; I don't expect to lose or add any courses (except by student demand).

Numbers are low in second year, 2--3 students in each of MATH 201 (Multivariable Calculus), MATH 202 (Vector Calculus), MATH 203 (Differential Equations), STAT 206 (Calculus Based Statistics), PHYS 201 (Classical Mechanics), and PHYS 202 (Modern Physics) but the college is committed to offering second year courses, so these will continue running; I have been told to put some the material for these courses online.

COLUMBIA COLLEGE—Ana Culibrk

In September 2015 Columbia College introduced a new Associate of Science Degree with Concertation in Mathematics.

Students in this program complete all the requirements for an Associate of Science Degree including the following mandatory courses:

- Calculus I & II (MATH 113 and 114)
- Discrete Mathematics (MATH 120)
- Three courses in Mathematics at the second year level. These are Calculus III (MATH 213), Analysis I (MATH 225) and Linear Algebra (MATH 252)
- Two Computer Science courses, Introduction to Computer Science and Programming I and II (CSCI 120 and 125).

Completion of this Degree fulfills the requirements for a Flexible Pre-major in Mathematics.

Due to large enrollment in the last two years and the new associate degree, each term, including the summer term, we offer three to four second year Math courses. This term we are offering Linear Algebra, Introduction to Ordinary Differential Equations, Discrete Mathematics II, and Mathematical Statistics with Probability.

Columbia College historically had been divided into four divisions:

- Social Science
- Science
- Academic English
- ELC

The Math and Computer Science Departments used to be a part of the Science Division. However, last year we formed a new, independent division – the Math & Computer Science Division. Our new division has approximately twenty instructors,

including the sessional instructors. The rest of the Science division became the Natural Science division, and Columbia College has 5 divisions now.

COQUITLAM COLLEGE—Gera Belchev

Course changes: There are no changes in the current course offerings that will affect the course agreement.

Enrolment: Over the past year very healthy and slightly up.

DOUGLAS COLLEGE—Natasha Davidson

Enrolments continue to be strong – administration continues to be willing to offer additional sections where they can be filled – this past year we had an additional 1.5 demand sections which we will continue to schedule. We had some contract work for this year – totally 5 sections of work. Enrolments in our second year courses are also good and we are offering Calculus III and IV, Differential Equations, Calculus based statistics as well as Linear Algebra, and Discrete Math II – with most of these offered this past Winter semester.

The new calculus for biological sciences course is officially on the books and two sections of the first semester, Math 1123, will run in the Fall and a section of the second semester, Math 1223 will run in the Winter. Articulation with UBC for the second semester is still a work in progress but otherwise articulation agreements are in place.

In for order requirements from the University of Waterloo to articulate a one-year block transfer we are developing two one credit courses – they will be Math 1121 and 1221 – which when taken with our science stream calculus (Math 1120 and 1220) would become an first year honours calculus sequence.

Also under development is a non-calculus based second semester of statistics – this course is aimed at meeting the research needs of future health care professionals, in particular nurses.

The Computer Science department is still under the umbrella of Mathematics and we currently have one faculty member. A Certificate in Computer Science is making its way through the internal channels at Douglas.

The new diploma, Engineering Essentials, has been approved.

KWANTLEN POLYTECHNIC UNIVERSITY—Mike Nyenhuis

No new courses, and enrolments seem to be steady. We had three “regularization-track” hires last year. Lin Hammill retired in December. Jan Verster and Trish O’Brien had retired earlier.

The B.Sc. is going well. We have our first graduating class of 3 students!

LANGARA COLLEGE—Nora Franzova (Math) & Kevin Craib (Stats)

Langara's Math and Stat Department had a fairly stable year. No new courses that would need an articulation were added. We are hoping to articulate our Math1170 course with UBC, since there is a lower level course that gives students unassigned credit at UBC, it would be nice if this course (Math1170) was also worth some credit. This was presented last year, but there seem to be no change yet. We will need to investigate. We successfully changed wording on transfer for Math2471 to UBC – where it uses the word “exempt” instead of previously used “preclude”.

Enrollment in Calculus for business is declining, but enrollment in Calculus for Sciences is increasing. We speculate that it might be due to the fact that our international students (now mainly from India) are heavily interested in studying Computer and Health Sciences.

Langara School of Management was very successful in recruiting students this year which brought in several more sections of introductory level statistics courses (equivalent to Stat1123) and as of September it will also bring a business math course (equivalent to Math1118). All these sections are taught by the Math and Stats department.

The department is thinking about offering an Associate Degree in Actuarial Sciences. The curriculum and the feasibility of this degree are being investigated.

The department will have two retirements this year: Cheryl McKeeman and Edgar Avelino ☺.

We are hiring, at least 3 new temporary faculty.

This past year, as a part of our outreach we visited General Wolfe Elementary Schools in Vancouver with our Math Fair projects presented by students of Math for Elementary Ed. We hosted AMC (American Math Contest), BC Secondary School Math Contest and the regional Science Fair. We hope to the same next year.

NICOLA VALLEY INSTITUTE OF TECHNOLOGY—Al Fukushima (in absentia)

NVIT offers two stats courses. Stat 203 and BUSM 207. The course outlines are for the most part identical.

NVIT offers BUSM 200 – Finite Math (Business Math)

NORTH ISLAND COLLEGE—Jeannie Cameron

Starting September 2016, NIC will revive a dormant second year math course MAT 200 Linear Algebra. MAT 200 will be taught at the same time and in the same classroom as MAT 133 Matrix Algebra. The two courses have different prerequisites and assessments. MAT 133 is applications-based and designed for engineers. MAT 200 is theory-based and designed for math majors. There is also a distance option offered for MAT 133 and 200

NORTHERN LIGHTS COLLEGE— Hongbin Cui (in absentia)

In the University Arts and Sciences program at NLC, our sciences have not come back yet. Consequently, we still don't offer any courses in physics, chemistry or computer programming. The Math/Stats courses we offered in the past year were: a section of Math 101 Calculus I (Dual Credit), a section of Math 190 Principles of Mathematics for Teachers, a section of Math 108 Finite Mathematics, and three sections of Math 104 Introduction to Statistics (face-to-face and online). Enrollment in Math 104 was strong as it is a required course in our highly demanded programs like Business Management and Criminology.

Open textbooks have been used in Math 101 and Math 104, although they are far from satisfactory.

NORTHWEST COMMUNITY COLLEGE—Reagan Sibbald

University Credit Transfer Courses

Math 101: Calculus I

Math 102: Calculus II

Math 115: Pre-Calculus – Video Conference from Terrace

Math 190: Principles of Mathematics for the Elementary Teacher - Online and face to face

Math 131: Introduction to Statistics

Textbooks:

Math 101/102: OpenStax Calculus text.

Math 115: M. Sullivan, Pre-calculus. 9th edition

Math 131: M. Triola, Elementary Statistics, Canadian 3rd edition

Math 190: O'Dafferet al. Mathematics for Elementary School Teachers

Software: Maple 17/Mathematica, D2L for online offerings and Vidyo for VC

Enrollment 2015-16:

Rupert Campus: Math 101(5), Math 102(2), Math 131(16)

Terrace Campus: Math 101(9), Math 102(5), Math131(12)

Online: Math 190(8)

Video Conference: Math 115(7)

Enrollment 2016-17:No information yet.

Math Lab: Math 101/102 now has an additional 1.5 hours per week for tutorials.

OKANAGAN COLLEGE—Jason Schaad

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 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. Two of those courses, Regression Analysis and Modern Statistical Methods, will be new courses.

The Sustainable Construction Management Technology at the Penticton campus has been running over the past 2 years. The 3rd year will run this year. It is likely that a new intake will occur in the fall of 2017 (which translates into a couple more courses for us).

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. Though, a new application system makes a direct comparison with last year's numbers dicey. Despite strong enrollment and application numbers, we are still feeling the budget crunch.

We are now offering 3 sections of Calculus I in the fall and 1 in the winter with 2 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 2 sections of Math 251 (Discrete Structures) in the winter semester. All other UT Mathematics courses are single sections.

We converted one hired 2 new faculty members this year. One of whom is a maternity leave replacement. The other is based in Penticton. Jason Schaad has moved to Vernon.

We perpetually find ourselves short staffed. While increasing enrollments is a good problem to have, hiring is a time-consuming process. We are in the early stages of hiring right now. Typically, we have enough non-continuing work to make up over one full workload. We have far more than that this year (and I suspect next, too).

We ran SNAP Math Fairs at the Kelowna and Vernon campuses this year. The events have been successful and will be continued. At all three campuses, students from OC MATH 160 – Math for Elementary School Teachers – are involved.

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.

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.

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—Glen Van Brummelen

Quest University is a private liberal arts college, entering its tenth year, with approximately 700 students. We offer the degree of Bachelor of Arts and Sciences. Students design their own concentration programs in consultation with faculty; these programs may be within a discipline or interdisciplinary.

Our mathematics courses are divided into two categories. Every student at Quest must take a "foundation" mathematics course, intending to reveal through practice how a mathematician approaches and solves problems. The learning outcomes for these courses emphasize process rather than content; the topics can range from problem-solving to cryptography to the history of mathematics to spherical trigonometry.

"Concentration" courses follow a more traditional path. Currently we offer Calculus I/II/III, differential equations, linear algebra, discrete mathematics, abstract algebra, real analysis, complex analysis, and mathematical methods in the physical sciences. We also offer two statistics courses listed under the "Interdisciplinary" designation: a general introduction to statistics, and an applied data analysis course. Given the demand, we are considering expanding our statistics offerings in the near future.

ROYAL ROADS UNIVERSITY—no representative sent

SELKIRK COLLEGE—Doug Henderson

Selkirk offered no new math courses this past year (we didn't lose any, either). Our student numbers remain largely unchanged from the previous year. Calc I saw a modest increase (~10%). The one class seeing a large increase in enrolments was our Math 050 (equivalent to Pre-Calculus 11) largely due to an increase in international students.

No new courses are planned for the 2016-17 school year. A new biomedical statistics course previously planned for our Rural Pre-Medicine students will not be offered, and they may take our calculus-based statistics course (Stat 206) as an elective, instead.

SIMON FRASIER UNIVERSITY—Justin Gray & Richard Lockhart

Mathematics—Justin Gray

Over the past year there were no completed changes to our undergraduate program that might affect transfer credit. A notice of intent to offer a joint mathematics and economics major and honours program has been approved, and a full program proposal is forthcoming. There is interest in creating a joint mathematics and statistics major and honours program but no notice of intent has been presented yet. Changes to our MATH 154/155 sequence (Calculus I & II for the Biological Sciences) are in progress, bringing the course more in line with UBC in terms of content (but without adding series), and placing a stronger focus on applications to the life sciences.

Statistics—Richard Lockhart

SFU Statistics and Actuarial Science has experienced some modest enrollment declines due to ENSC dropping our STAT 270 in favor of their own course. Sociology and Anthropology are about to drop our service course STAT 203 and that will decrease enrollment as well, perhaps more. Enrollments in our minor are much higher over the last two years because we have created a route to the minor with weaker mathematics and theory requirements.

We are moving to eliminate a number of restrictions which prevented students who had taken statistics in other departments from taking ours. We will now also allow our STAT 100 to be taken after other STAT courses.

We have introduced two new lower division courses, 180 and 240. STAT 180 is a 1 credit seminar course on career development in which we bring in weekly speakers from government and industry. STAT 240 is Introduction to Data Science; it is designed to get lower division statistics students to see real data earlier and has a big computing component.

We have also created a big data course, 440.

Our major has, until now, required a minor in another discipline but we are weakening this to 12 credits and barring MATH, ACMA, and MACM from being used to meet this requirement.

Rick Routledge has retired and Robin Insley will retire at the end of August. Marie Loughin is now doing a reorganized version of Robin's job.

THOMPSON RIVERS UNIVERSITY—Richard Taylor

TRU has made no course or program changes that might affect articulation agreements.

THOMPSON RIVERS UNIVERSITY (OPEN LEARNING)—Chris Morgan

Enrolments:

Open Learning enrolments have been fairly flat, year to date. There has been a 1.01% increase in overall Math/Stats registrations.

New Math faculty:

Enrique Torres Giese – MATH 2111 (Multivariable Calculus)

Saeed Rahmati – MATH 1141 (Calculus I), MATH 1651 (Mathematics for Computing Science)

Alan Meichsner – MATH 1241 (Calculus II)

New Math Courses:

MATH 1651 (Mathematics for Computing Science) is a service course for computing science students who need background in mathematics to take advanced courses in computing. Topics include: number systems; vectors and matrices; geometry; discrete probability, statistics and random variables.

TRINITY WESTERN UNIVERSITY – Rick Sutcliffe

Department Chair & Coordinator of Mathematics: Dr. Arnold Sikkema (Professor of Physics), Arnold.Sikkema@twu.ca, 604-513-2121, ext 3185

Representative at the 2016 Articulation Meeting: Prof. Rick Sutcliffe, rsutc@twu.ca

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 (the latter having just

re-opened in March 2016!), 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 are listed in the university calendar www.twu.ca/calendar and programme requirements (checklists) are at www.twu.ca/academics/calendar/checklists/default.html. Some general science take a concentration in Mathematics to go along with a Chemistry or Biology major. In the past there have 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		passing rate (2015-16)	
	4-year avg	2015-16	number	percentage
Precalculus (105)	22	10		
Calculus I (123)	104	93	74	80%
Calculus II (124)	40	32	29	91%
Elem. Educ. (190)	40	34	34	100%
Math. For Business (101)	154	156		
Nursing Stats (108)	49	42		
other Stats (102)	68	76		

UNIVERSITY OF BRITISH COLUMBIA - OKANAGAN—Wayne Broughton

No significant changes in Math.

UNIVERSITY OF BRITISH COLUMBIA - VANCOUVER—Wayne Nagata & Bruce Dunham

Math—Wayne Nagata

There have been no changes in the past year that affect articulation or transfer credits.

Statistics—Bruce Dunham

15/16 UBC Statistics department report: Numbers on the Statistics program continued to rise over the past year, with a total of 51 students graduating since May 2015, this being a record high. Enrolments are expected to increase further due to an influx from Vantage College, a new access route for overseas students from which approximately a third of the sixty entrants last year opted for a statistics specialisation on entering their second year. There are some concerns that the capacity on certain STAT courses may not meet the demand for places.

A proposal as passed this year to drop MATH 200 (multivariable calculus) as pre-requisite for STAT 241/251, the calculus-based introductory course in probability and statistics for engineering students. The new pre-requisite is now just MATH 101 or equivalent. The department has voted to attempt to move forward two further curriculum changes next year:

- (i) Add a credit exclusion between STAT 200 and STAT 241/251 and
- (ii) Remove the credit exclusion between MATH/STAT 302 (introductory probability) and STAT 241/251. The credit exclusion between MATH/STAT 302 and STAT 241/251 hinders students from applied science programs wishing to transfer to a statistics pathway, as such students are presently required to take 302 for no credit.

The final year of funding from UBC’s Teaching and Learning Enhancement Fund (TLEF) for our WeBWorK project saw the software introduced in STAT 344 (Sample Surveys). It is expected that additional funding will support the development of further questions in STAT 344 and STAT 305 (Introduction to Statistical Inference). The Flexible Learning project, also funded by TLEF, has progressed in the past year, developing applets, videos, in-class activities, and WeBWorK questions for introductory courses. All resources created will be open-source, and made freely available.

In a joint venture with Computer Science, the new "Data Science" professional masters program has been approved for launch in September 2016. The enrolment for the initial intake will be limited to around twenty, with an increase expected for the subsequent year. A new course code, DSCI, has been approved.

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

UNIVERSITY OF THE FRASER VALLEY—Ian Affleck

The Department of Math and Stats at UFV is happy to announce two recent full-time tenure-stream hires. **Dr. Shaun Zheng Sun** (statistics) joined us in August 2015, and **Dr. Kseniya Garaschuk** (mathematics) will begin in August 2016.

Our new **Applied Statistics Minor** is in the final stages of approval, and should be established for students to declare entry sometime in the coming year. A key feature of the ASM is that no calculus is required, making it an attractive option for students in Economics, Criminology, Business, and many other programs of study in the Arts, as well as for Science students. Statistics courses in the ASM are similar to those which are applicable to our **Data Analysis Certificate**, although the latter is a 10- or 12-month post-degree certificate with a significant computing component.

We are also developing a new course intended primarily for Arts students, called **MATH 100: Everyday Mathematics and Statistics**. This course has a grade 11 Math prerequisite, is unlikely to serve as a prerequisite for any other university level math courses. Topics include introductory statistics, financial math, geometry, for example.

Our enrollments are strong, mainly due to significant growth in demand for first-year statistics, business calculus and pre-calculus, and discrete math. These are service courses to Business and Computer Information Systems programs, whose enrollments are growing due to an increase in international student demand. Meanwhile, we have recently turned over instruction of all courses under 100-level to the Department of Upgrading and University Preparation (UUP).

Our recent introduction of a calculus stream for students in the life and social sciences continues. We offer one section of Calculus 1 each Fall and one section of Calculus 2 each Winter which highlight the relevance of calculus in biology. The special Calculus 1 section is formally no different than the standard Calculus 1 (same course number), but the special Calculus 2 section differs significantly in topics (more DE's, no series), has a different course number (MATH 118), and does not typically transfer to other institutions.

In terms of outreach, we hosted the Fraser Valley Regional Competition of Math Challengers, organized three Math Mania events, and hosted the BC Secondary Schools Math Contest for schools in the Fraser Valley region.

UNIVERSITY OF NORTHERN BRITISH COLUMBIA—No representative sent.

UNIVERSITY OF VICTORIA—Gary MacGillivray

We have three changes that may affect articulation.

First, as reported last year, our second year differential equations course has been replaced by Math 204. It includes vector calculus, and then some differential equations. The overlap with our old Math 201 (DEs) is about 2/3. Any student who comes to UVic with multivariable calculus and differential equations should be ok, unless they want to take certain courses in pure math. If they also have vector calculus in their education, there will be no trouble. Any institution that had a multivariable calculus course that did not articulate to our Math 200 should perhaps ask again now that the multivariable calculus has been moved into 204.

We have a new course, Math 248, which is required in our degree programs instead of Computer Science II. It is intended to focus on computational mathematics and the use of software packages, but is not yet fully developed.

An item that may cause some confusion is the split of our science calculus into two pathways. One of them (Math 100) is intended for students with prior exposure to calculus (in high school or otherwise). The other, Math 109, is intended for students with precalculus, and no substantial prior exposure to calculus. The level of the two courses is the same, and so is the endpoint: both lead to calculus II. The difference is that the approach taken in M100 will take into account the fact that the students have seen some calculus before. Any course that articulates to Math 100 still can (the prerequisite remains precalculus with a good enough grade). Any course that articulates to 100 should also articulate to 109, and vice-versa. There is no reason for any course to specifically articulate to 100 or 109. They are equivalent, and interchangeable in all programs that use science calculus.

VANCOUVER COMMUNITY COLLEGE—Costa Karavas (math) & Gabriela Kakushkin (stats)

The Mathematics Department in the School of Arts and Sciences offers multiple sections of six courses: 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).

First-year certificate programs in Engineering and Computing Science and Software Systems provide the option to VCC students to complete their 1st year courses at VCC and then transfer by either assured admission to SFU or by competitive admission to UBC and SFU. The certificate programs have increased enrolment in the existing calculus courses.

A new 1st year certificate program in Environmental Studies (three concentrations) is under development. It will provide the option to VCC students to complete their 1st year courses at VCC and then transfer by either assured or competitive admission to programs in SFU's Faculty of Environment. The Science concentration will require Calculus I and II courses, while the other two concentrations will require a statistics course. The new certificate is projected to start in September 2016.

The Introduction to Statistics course (MATH 111) is experiencing very high enrolment with students seeking entrance to Health Science programs. The number of sections has increased to six sections a year.

Software MAPLE 2016, MATLAB R2016a and MS Excel 2010 are used as supplementary tools in teaching.

VANCOUVER ISLAND UNIVERSITY—Eric Agyekum

Math Major on target (target date, January 2017).

We have received stage 1 approval from Senate – it has been put on the 3-year plan.

Lot of support for it on campus.

We plan to stop the informal policy of waiving Math 110 for students with B in Math 122 starting in Fall 2017.

Math 110 covers topics covered in MATH 100 and MATH 101 that are not covered in MATH 121 and MATH 122 such as polar coordinates, tests for convergence, and complex numbers.

We want students to learn the material even if they did well in Math 122.

We offered (formally) Math 254 (Calculus based Statistics) for the first time in Fall 2015. We are offering it again in Fall 2016 and hope to offer it regularly from now onwards. We also offered Math 131(Math for Elementary School Teachers) for the first time at our Powell River campus in Fall 2015. Enrolment was not good so we cancelled Math 132 (continuation of Math 131) for the Spring 2016 term. We continue to offer Math 131 at our Duncan campus.

Phil Dauk is retiring in July 2016 and Lev Idels is going down to half-time position from Fall 2016.

We are hiring for Temporary Full Time and Temporary Part-Time positions for the coming year.

We will be hiring for a regular position in Fall 2017 (please spread the word)

Mary Thompson, a Distinguished Professor Emerita of Statistics at the University of Waterloo (UW), will accept an Honorary Doctor of Science at Vancouver Island University's (VIU) convocation ceremony on Wednesday, June 8 at 2.30 pm. See more at: <https://www.viu.ca/news/viu-honorary-doctorate-recipient-helps-prevent-illnesses-and-early-deaths#sthash.EQashDyS.dpuf>

YUKON COLLEGE—No representative sent.

DISCUSSION OF REPORTS:

Leo Neufeld asks whether the new Universities are still offering associate degrees, because if so the new course offered at UFV could help to satisfy the math requirement for associate arts degrees. Capilano does, UFV does but they are not commonly used or tracked, VIU doesn't know, TRU doesn't in science but does have one in BA that is seldom if ever used, Kwantlen Polytechnic University doesn't know.

Lennart Berggren comments: it sounds like many of these institutions reported offering data analysis programs at the second year level, and also Calculus for the Biological Sciences.

Wayne Nagata comments: regarding UBC calculus, there is an internal requirement that all UBC calculus courses be equivalent in terms of satisfying prerequisites for second-year calculus. In particular, all calculus courses in the first year are required to have series in them (including business calculus). Any course that articulates to Calculus II in any flavour must contain series; this policy is from the faculty of science at UBC.

Deanna Baxter points out that the guideline for transfer articulation is 80% overlap between the two courses. Would this not allow a series-free version of calculus to be accepted at UBC in spite of the internal requirement, since 2-3 weeks is at most 15% of the course? It is a pity when a single missing topic, even one that takes only a few days, is the cause for denying transfer credit.

Jim Bailey does not think that the 80% guideline is written down anywhere.

David Leeming suggests addressing this issue with Rob Fleming of BCCAT tomorrow.

Wayne Nagata responds that these issues were raised internally, because they did not think this policy was reasonable, but that the faculty of science was not responsive. It could be helpful if a message from a higher organization (such as BCCAT) came to UBC.

Agenda item added: 14.1.5

- 7. Keynote Speaker** – Glen Van Brummelen, Quest University
Triangles Before Logarithms: Trigonometry in the Lost Century.

Glen Van Brummelen's talk described the history of trigonometry, with a focus on innovations from the 16th century. These innovations eventually changed the science of trigonometry from a tool used only to describe the heavens to a tool that could be (and was) practically applied.

Note: Glen is happy to share his slides with anyone who is interested, although he warns that they do not display well in PowerPoint.

8. **Publishers' Representatives:** the latest developments related to Mathematics textbooks
Representatives from Pearson (MyMathLab), Lyryx (Lyryx with Open Texts).

The Tuesday session of the BCcupms adjourned at 4:24pm.

BCcupms and Secondary Teachers Session

9. **Introduction and opening remarks**

The committee welcomed Ying Ting Lu (future teacher, current UBC student), Suman Bians (Lord Byng Secondary), Michael Tang (Fraser Academy), Deborah Mackie (Britannia Secondary), Michael Pruner (BCAMT), and Mark Girard.

10. **Reports:**

10.1 BC Secondary Schools Mathematics Contest – Paul Ottaway (See full report at end.)

Was written May 6th. A bit of a transition period now, because Clint Lee from Okanagan has been replaced by a team, and they are developing their own process. Preliminary reports suggest that average scores by students are consistent with past performance. At Capilano there were two perfect papers, but the average score was similar to past years.

Moving forward, would like to make the contest more accessible to a wider range of students. Want to introduce some easier questions at the start but keep the end of the test very high level. Goal there is for averages to increase while the number of perfect papers stays low.

Also need to make sure that test questions respect curriculum, in the sense that a grade 10 student should not have a curriculum-based advantage over a grade 8 student since they both write the Junior version of the test. For example a problem that has a quick calculus-based solution should not be included on the Senior test.

Next year; Wed April 5th for preliminary contest, Friday May 5th for final contest. Junior: 8 – 10 Senior: 11 – 12.

Want to help write problems? Contact person is Suzanne Feldberg sfeldberg@tru.ca The Monday before the articulation meeting there is always a day-long working session, and if you see a good question somewhere, have any opinions or questions or comments, then please email Paul Ottaway or Suzan Feldberg. In particular, they welcome input from high school teachers – adjudicating difficulty level is one of the hardest parts for the contest designers.

Discussion

Math Competition participation

How many of the schools represented here participate? Deborah Mackie (Britannia Secondary) says her students always participate even though their students tend to struggle more than usual with math. They noticed the easier intro questions and appreciated them. Suman Bains (Lord Byng Secondary) is at a more academic school in Vancouver and many students participate and enjoy.

Deanna Baxter recommends that colleges and universities that do not currently do the competition consider starting. It's a good experience, a great outreach activity, and a way to bring students to your school and to connect with teachers who send students to your schools. Although it started in the colleges there is no reason for bigger institutions not to host too.

Question from Eric Agyekum: do teachers prepare the students, or do they find out about the contest and prepare for it themselves?

Answers from teachers: sometimes teachers of the honours courses coach.

Question from Natasha Davidson: do you encourage non-honours students to participate?

Answers from teachers: depends on who is teaching that year. One teacher responds that at his school generally those students on the precalculus stream are encouraged but not the foundations or workplace students.

Jim Bailey and Paul Ottaway mention that the philosophy behind the contest is not to be exclusive, but rather to be interesting and approachable for any student who is interested in math (not just those with a strong aptitude for accelerated math).

Suman Bains says the perception among both students and staff is that the content is challenging, intended for top students. Having taught at several schools in Vancouver, her current school is the most academic and has the highest participation rate. At the other five or six schools she has taught at, although each teacher advertises to students it is only the enriched or honours stream students who are interested.

One teacher says that if it isn't for marks then students don't want to participate in it seriously, and it cannot be for marks because it is not curriculum.

New electives

Costa Karavas: when do your students tend to take Calculus 12 in the school year? How many take it?

Answer: One teacher replies that his school has 50 students in two classes (around 1/3 of the students), and they take it concurrently with Precalculus 12. At Lord Byng Secondary, it's also taken by around 1/3 of the students, but those students take either Precalc 11 or Precalculus 12 in the summer so as to be accelerated by one year – they then take Calculus 12 as their only grade 12 course. Alternately they take Precalculus 12 for the first half of the year and Calculus 12 for the second half of the year.

Richard Lockhart: suggestion of a statistics elective course in the new curriculum. How many of you would be comfortable teaching it? Happy teaching it?

A few teachers are comfortable, but they are doubtful that the course will actually run. Suman Bains thinks that most high school students don't yet have the very specific interest focuses necessary for taking such specific elective courses. She thinks that broader-interest math topics are more likely to reach enrolment needs. Students might also think they are closing off doors, rather than opening them, by choosing such specific courses. Another teacher points out that high school classes have around twice the contact hours as university courses, which means that filling the course with content could be a challenge, particularly for a teacher who is not expert in that particular topic.

10.2 BCAMT – Michael Pruner

Current president of BCAMT. Mandate to support math curriculum across the province. Finished Northwest conference at Whistler in October, was a good conference and a success. On October 21st, 2016 it will be held in Vancouver at Gladstone Secondary. Registration open now, as well as speaker proposal page – please consider submitting a proposal.

<http://www.bcamt.ca/fall2016/#top>

New curriculum is a hot topic across the topic now. Roll out for K-9 is this September. BCAMT is developing resources to support teachers in teaching the curriculum, mostly to help them get a feel for the philosophy behind the new curriculum. Competencies of mathematics are heavily emphasized, while content runs side-by-side with those competencies. Of the 24 executive members of BCAMT, seven are participating in developing the curriculum. Also have struck a committee of non-curriculum-writers from the BCAMT to write feedback for the ministry of the curriculum.

Another goal this year is outreach: conferences are very well attended by teachers in the Vancouver area, but teachers from outside that area are not getting as much professional development. Sent members to remote areas of the province to lead professional development workshops this year.

Susan Oesterle: any information about assessment for K-9 that you've heard of yet?

Michael Pruner says not yet: hard to know about how to design assessment until they've had the reporting guidelines from the ministry. They expect to get that soon (K-12) from the ministry.

10.3 Calculus Challenge Exam run by UBC and SFU – Justin Gray

It is SFU's turn to host the Calculus Challenge Exam this year. Based on BC Calculus 12 curriculum, but given at the level of a first semester course. Open to any student currently taking a high school calculus course of any kind (Calculus 12, AP Calculus, even home schooled students). Can claim credit from any of the participating institutions (SFU, UBC, UVic, or UNBC) based on results of this exam. For students not close to the lower mainland, teachers can sign up as invigilators and administer the exam for their students.

June 9th, although registration is already closed.

See reports on past exams here:

https://www.sfu.ca/math/students_teachers/calculus_challenge_exam/exampractice.html

Questions from attendees:

How different is this exam from what you would ask of a university calculus class?

The topics differ somewhat, because (for example) the Mean Value Theorem is not included in Calculus 12 curriculum but the Fundamental Theorem of Calculus is. Students are also permitted to use the ministry-approved calculator, which an SFU student wouldn't be allowed to use.

My [high school] student told me that their score would be used as their course grade. Is that true?

Yes, but at SFU there is the option of using it as a grade-free transfer credit instead. More information about how participating institutions grant credit can be found here:

https://www.sfu.ca/math/students_teachers/calculus_challenge_exam/claimcredit.html

Do you prefer that students from this area write at the SFU campus or at their own schools?

No preference; teachers are welcome to invigilate at their own schools. To register as an invigilator, click on "Invigilators -- Click Here to Register!" on this website, when registration is open:

http://www.sfu.ca/math/students_teachers/calculus_challenge_exam/challenge-exam.html

11. General discussion

11.1 Over the past 10-15 years, how has the transition from high school to higher education changed?

Natasha Davidson: lower numeracy skills. Greater expectation of personalized content. Lower personal expectations.

Justin Gray: we have some data, because we've been running a calculus diagnostic test at SFU since 2007 which hasn't changed much. Given to all students in the first week of their calculus course, and extra support offered based on results. Averages over those years have not changed much. Having said that, we have increased the minimum grades required from high school math courses as prerequisite for calculus courses. This increase happened in response to grade inflation concerns following the discontinuation of the provincial exams. In spite of the increased grade requirement, scores on this diagnostic have not increased.

Deanna Baxter: at Capilano there was a noticeable difference around the time that provincial 12 exams were eliminated. However at the same time Capilano dropped the placement test they used to have for students who had been out of school for a certain amount of time, and SFU and UBC opened up extra seats – so quality of students did change at that time. It seems now that skill sets of students are *different*, but not necessarily *worse*. Students ten years ago were very good at factoring: to the point that they factored when they didn't need to. Now on the other hand they are better problem solvers and have trouble factoring. Numeracy does seem to be a problem; students are less confident with arithmetic – but it is more important that students be able to look at an answer and decide whether it is reasonable or not. Attention spans do seem shorter now, although that is true of all of us and not just of students. Worried that students are not able to spend 20 minutes consecutively working at home without being distracted.

Wayne Broughton: in terms of basic skills, knowing basic facts, students in the last few years have dropped. Now they don't know trig identities or remember anything about logarithms. Factoring, handling algebra, rational expressions. From talking with high school teachers in the Okanagan, perhaps because students aren't getting the same homework experience – not getting reinforcement of doing practice problems.

Suman Bains: not at all surprised to hear that. Concerned about the direction things are going. New curriculum and changes with assessment – people want to throw out the traditional way of doing things. Big push toward project-based learning, and a lot of newer teachers accept these suggestions enthusiastically. But students also need the basics. And at the University level they still face traditional assessment models.

Rick Sutcliffe: looking at 15 years of pre-test data (multiple choice test) the averages are very consistent. With 33 years of final exam experience, can see that change dramatically with each new curriculum change. There's a bump that then smooths out after a few years. In terms of specific topics: superficial memorization of topics and facts seems dominant, but deeper understanding and problem solving has gotten worse.

Wayne Broughton responds: we at the post-secondary level are not adapting or changing. Maybe we *shouldn't* be doing things the same way for the past 20 years. Maybe some things aren't changing at the same rate they have been at the high school, so some of the disconnect could be due to our lack of change.

Bruce Dunham responds: this is not a criticism of teachers but rather of the training they are given. So little of the research into how students learn makes its way into teaching training. We see many students who are committed to what the research shows are poor study methods.

Julie Peschke: returning to the numeracy skills question. Operations on numbers later becomes algebra – operations on functions – then inner product, dot product – operations on vectors. All of these higher-level concepts are based on elementary school training. The repetition of the theme is useful for reinforcement. Developing a program at the university level where students take a basic skills course and are forbidden from using a calculator on the final exam. Need to develop a philosophical base.

12. Adjourn to reception

The meeting adjourned at 5:49pm.

DRAFT

WEDNESDAY, MAY 18, 2016
Plenary Session

13. Opening remarks

13.1 Introduction of representatives.

13.2 Attendance lists: Deanna Baxter circulated the attendance lists.

13.3 Announcements from the host.

14. Reports

14.1 BCCAT – Rob Fleming

14.1.1 BCCAT Report – Spring 2016

A two-page report is available here: <http://www.bccat.ca/pubs/AC%20Update%202016%20Spring.pdf>

Awards

The 2015 BCCAT Transfer Awards winners were:

Transfer & Articulation Community Leadership – Dr. Carol Pollock

Leadership Award – Dr. Peter Wylie

Franklin Gelin Lifetime Achievement Award – Dr. David Leeming

BCCAT is calling for nominations in the following categories for 2016:

Leadership Award

Transfer & Articulation Community Leadership Award

Rising Start Award

Franklin Gelin Lifetime Achievement Award

Further information at <http://www.bccat.ca/system/awards>

Collaborations:

BCCAT collaborates a lot with **Alberta** (Alberta Council on Articulation and Transfer) and **Manitoba** (Campus Manitoba). This includes technology sharing: instruments used to transmit transfer guides.

The BCCAT worked with the **National Registrars Association** to get a national language guide for credit transfer and transcription. Proposed a live database constantly maintained.

Jan Unwen, Superintendent of Graduation and Student Transitions from the **Ministry of Education and Advanced Education**, is on a BCCAT committee focusing on the graduation requirements in the future.

Conferences:

Dual credit is an interesting topic lately. Camosun College hosted a forum on the subject on April 22nd. The BCCAT has a recent report on dual credit, and an ongoing project aimed at exploring options for the quantitative analysis of dual credit students' progression to post-secondary institutions and their eventual academic success.

See the report at <http://www.bccat.ca/research/projects/dualcredit>

The PCCAT/ARUCC Conference will be held in Vancouver this year at the Sheraton Wall Centre on June 22 and 23. The theme will be "Approaches and Benefits of Credit Transfer Initiatives across Diverse Institutions, Sectors, and Jurisdictions." <http://pccatweb.org/pccat-2016/>

The Inter-Provincial Transfer Credit forum was held at the Harbour Centre on September 21st. Details at www.bccat.ca/about/iptf

Projects and reports:

Transfer Innovations Project funds are available. More information about how to apply is available at <http://www.bccat.ca/articulation/projects>

BC International Student Survey – Final Report. Highlight: the #1 reason they want to come is quality of education, and their satisfaction is very high. Individual institution information was sent to the institution, and aggregated data is published in that paper. <http://www.bccat.ca/pubs/ISSReport2015.pdf>

Elements of an Effective Transfer System: This Special Report reviews the common and recommended elements of transfer and articulation policy in the US. The BC system of higher education was based on the California model, so bears numerous similarities to US policies and practices, making such a review a good touchstone and reference. <http://www.bccat.ca/pubs/EffectiveTransferSystem.pdf>

Experiential Learning: working with a researcher from SFU; report will be ready in August for publication in the fall. Reinforces challenge of nomenclature and practices.

Academic Advising Research: This report examines the literature on the topic, surveys current practice in BC institutions, and offers examples of successful practices and identifies areas for future research.

<http://www.bccat.ca/research/projects/advising>

Transfer Student Profile Reports BCCAT published a report on success of transfer students, and has done so again. Depends on institutions choosing to share their data. <http://www.bccat.ca/research/projects/profile>

Rob Fleming then showed us some charts of data regarding total transfer students, credit transferred, etc., in aggregate. Noted that around 80% of transfer credit in Math & Stats was “assigned”, which demonstrates good articulation. These datasets can be made more specific for institutions upon request, and show things like transfer by region, transfer by course, etc.

14.1.2 BCCAT and related system initiatives

Manitoba has developed a new version of what BCCAT has. Alberta is talking with Manitoba to adopt that version.

Not sharing databases at this time. If that were to be considered there would be consultation. The databases can, however, interface. In the future it is possible that institutions could upload their full transfer agreements (international even) to that database if they were interested in doing that.

Natasha Davidson expresses a concern about combined databases: currently it is the case that course A and course B have enough overlap to transfer, and that course B and course C also have enough overlap to transfer, but course A does not transfer to course C (that is, articulation of transfer does not have the transitive property). Would this inaccurately turn transfer into an “equal” sign?

Rob Fleming clarifies that this is not the case and that new transfers would not be created.

Wayne Nagata asks: why do courses between UBC-V and UBC-O not show up on BCCAT?

Rob says that they do appear as separate institutions because there are two senates.

Wayne Broughton (UBC-O) says he has been told they are not sufficiently separate to show up and are instead campus equivalences.

Wayne Nagata points out this means that the agreements are not publicly available or available to students.

Rob says he will look into it.

David Leeming asks how many post-secondary institutions there are in Manitoba. Rob thinks 7 or 8 only.

(There are 8 listed on the Campus Manitoba website: <http://www.setyourcourse.ca/education-pathways/universities-colleges>)

14.1.3 2015 and 2016 JAMs

The 2016 Joint Annual Meeting (JAM) will take place November 10th, at the Westin Wall Centre Hotel in Richmond. Presentations from last year’s JAM and information about the upcoming JAM available at <http://www.bccat.ca/articulation/jam>

Susan Oesterlie mentioned how much she enjoys attending the JAM. In particular, Math representatives have won the lifetime achievement awards for the past two years (Leo N. and David Leeming). The committee recognized David Leeming for his achievement.

14.1.4 Pending Requests in the Transfer Credit Evaluation Systems (TCES)

See list circulated prior to meeting.

14.1.5 Calculus transfer at UBC

Following up on the UBC-Vancouver institutional report, Jim Bailey asked Rob Fleming to clarify the expectations of course overlap for transfer credit.

These are institutional decisions, but it is the position of BCCAT that 70% and up should be the point at which institutions consider accepting transfer. In particular cases institutions consider how essential a specific topic is in terms of students being able to continue in their programs.

In the case of UBC-V, Wayne Nagata has found out since Tuesday that there are a significant number of Commerce students who do take future courses that require series – so even the business calculus students do need that particular topic in order to continue.

Deanna Baxter points out that this committee has worked very hard to as much as possible standardise first year calculus. So it is a challenge for institutions that would like their courses to transfer to UBC-V – those institutions need to change their curriculum in order to be UBC-V transferrable. Yet it is UBC-V administration that is not following the standards to which this committee agreed, in spite of signing onto the agreement.

David Leeming points out that the concern is essentially for administrative convenience. Wayne Nagata reiterates that the department wished to unlink their two types of calculus internally and was denied permission at a higher level.

Natasha Davidson requests that BCCAT asks UBC-V to send someone to these articulation meetings who has authority to make these agreements. Bruce Dunham clarifies that articulation requests sent to UBC-V (for statistics at least) go to him, not to an administrator. Wayne Nagata confirms that the person who receives articulation requests sent to UBC-V for math is a department member, but one who follows faculty of science guidelines very closely. The department warned the faculty that the faculty's refusal to decouple the two types of UBC-V calculus courses would have articulation consequences, but the faculty did not consider that enough reason to allow the decoupling.

Action item: Rob Fleming offers to reach out to the dean of the faculty of science (Paul Harrison) at UBC-V to request a conversation between him and Jim Bailey.

14.2 PIMS – David Leeming (See full report at end)

In addition to his report, David Leeming also showed us a slide show of photos from some of the past year's events, including visits to Captain Meares Elementary Secondary School in Tahsis and Cedar Elementary School in Campbell River.

14.3 ABE – Costa Karavas

Meeting: Adult Basic Education Mathematics Working Group

Date of meeting: March 3-4, 2016.

Location: Douglas College (New Westminster campus)

1. **ABE has returned to a tuition fee model**

Most institutions have applied tuition as of last year. The tuition fee model in ABE has affected enrolment (decline of about 20%) as students experience added financial difficulty in obtaining the upgrading courses they require for entrance into post-secondary programs.

Students attending a public post-secondary institution in B.C. and enrolled in skills upgrading or education and training courses in Adult basic education, Adult special education and English as a second language can be eligible for financial assistance from the "Adult Upgrading Grant", based on financial need. Many institutions have offered a top-up grant as financial support to ABE students from the one-time funding institutions received for Adult Basic Education (ABE) to aid in the transition to the new tuition fee model.

2. **Articulation of ABE courses**

Curriculum development for a new course "Foundations of Mathematics" has been completed which is equivalent to "Foundations Math 11". This course is an alternative for students who want to continue in post-secondary programs where calculus is not required. The majority of institutions offering developmental programming expressed that they do not have the student demand for such a course, but there are some institutions that desire such a pre-requisite course for their programs.

3. 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

Discussion:

Many institutions have offered a top-up for ABE students in the form of a grant. This comes from one-time funding that ABE institutions received for the transition to a tuition fee model. That money is running out, so we anticipate losing a lot of students. Students need \$500-\$1000 for a course, some courses can be more expensive even than a three-credit course.

Regan Sibbald asks about the impact on First Nations people. Is any funding available to mitigate the impact there? Costa is not aware of any. Although each institution has the ability to tailor their Adult Upgrading Grant to an extent, it must be based on financial need.

Deanna Baxter says her understanding from her institution is that some First Nations students can get funding for post secondary but it must be for 100-level or above courses.

Nora Franzova mentioned the existence of a petition that had circulated at Langara to pressure the ministry to revert to the previous funding model. Any similar petitions elsewhere?

Costa says approximately 50% of their students at Vancouver Community College receive the Adult Upgrading Grant, making their courses free for them, but the other half are still impacted.

Lennert Berggren asks what completion rates are in ABE?

Costa says it is very high now. These students are determined, focused, and know what they want – and this is even *before* post-secondary. When it was tuition free, this was not the case. At a guess, perhaps completion rates were around 60% previously.

Natasha Davidson wonders whether this is partly due to the fact that students who are unable to pay are also likely to be ones who have difficulty navigating systems and cannot get support. We shouldn't assume that the explanation for higher success rates is that people only value what they pay for as it could well be that those most disadvantaged and therefore more likely to need more than one attempt, are those now excluded from our statistic.

Costa agrees that adult students have difficulties, such as working while studying, having been out of school for a lot of time, and dealing with high cost of living in Vancouver as well as textbook costs.

14.4 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-one to see who first solves a problem. Parents, coaches and the other competitors thoroughly enjoy the excitement of this elimination round.

This year over 716 students participated at the Regional level, which is slightly less than the number in 2015. Grade 8 teams came from 43 different schools and Grade 9, from 48 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 UBC this year. It's a really fun and enriching day for all!

1.1 Math Challengers 2016 Regional Competition				
1.2 Grade 8	Lower Mainland	Vancouver Island	Okanagan	Fraser Valley
Schools	24	4	6	9
Teams	42	8	8	16
Competitors	195	39	39	79
1.3 Grade 9				
Schools	31	4	6	7
Teams	51	7	8	8
Competitors	256	30	39	39

Again this year as was done in 2015, twenty Grade 9 students selected from high scoring individuals at the Provincial competition were invited to an Enrichment Day held at UBC on May 14. The day was 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 and UFV 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 and in the Fraser Valley. **Satoshi Tomoda** originated the Okanagan event and **Ian Affleck** leads the one in the Fraser Valley. Colleges and universities are ideal sites for hosting MC. We'd love to see this opportunity expanded to include kids in the entire Province. The Kamloops, Prince George and mid-Vancouver Island regions could easily become new start-ups.

For information about MC: <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>

Discussion:

Leo Neufeld encourages us to start up new branches of Math Challengers. Ian Affleck, of UFV, visited Math Challengers at the Okanagan in 2013 to see what it was like there, and spoke about his experiences starting up a new Math Challengers at UFV in 2014, 2015, and 2016. In 2014 they had over 150 students come from 16 different schools. Ian expected this to relieve some pressure from the lower mainland one (over 400 students typically), but in fact it did not. This was a net gain of roughly 150-160 entirely new participants. There are schools out there that would participate if they had a local venue.

14.5 Changing the Culture – Nora Franzova

This year's Changing the Culture was held on May 13, 2016. Topics included Active Learning and improving retention of female students between Calculus 1 and Calculus 2.

Mathematics and Statistics Subcommittee Sessions (held concurrently)

15. MATHEMATICS SESSION (Chaired by Jim Bailey)

Math1. Report from the Calculus Readiness Test Subcommittee—Justin Gray

Institutions can use this test for their own purpose, either as an advisory test or a placement test. The mandate is to design a test that is intended to assess readiness for first year calculus. Originally based on the math proficiency report of this committee. This report in turn was based on a large survey of instructors, reporting what skills they considered most important for calculus readiness.

The resulting test was 30 questions. The goal is to create a 30-question multiple-choice test. Justin collected contributed questions, and then let students generate the distractor answers. Thanks to College of the Rockies and Douglas College and Langara College, the test was run in an online free-response format with multiple tries per question available. To identify distractors, these questions were not randomized so as to be able to identify what wrong answers were frequently chosen by the students.

Justin then analysed the results. He was particularly interested in determining which questions were good discriminators (that is, the number top cohort students who got the question correct is significantly higher than the number of bottom cohort students who got the question correct). For each topic there were several questions, and Justin generally selected those that had high discrimination. After that he sorted the incorrect answers for each to identify popular incorrect answers, which then became the distractors for the multiple-choice version.

The result was a 30-question multiple-choice test with student-generated distractors. The test is probably a 40-minute test, but Justin is not yet certain of this. The next step is for Justin to randomize the questions and add algorithmic generation.

For some of the questions he was unable to determine the source of popular incorrect answers, which is making this step difficult for those questions. Justin would appreciate volunteers to help with this.

Volunteers: Wayne Broughton (UBC-O) and Natasha Davidson (Douglas College).

Justin expects this test to be ready for Fall 2017. Can provide randomized versions of the test with answer keys. Can also be delivered online through the SFU system. Can also scan your sheets for you if you use Scantron. Would of course like to follow the students to determine whether the test is a strong predictor of success.

If you would like to see the test, please contact Justin at jgray@math.sfu.ca (this is *not* the same test currently available on Justin's website, which is the SFU placement test). He will find a way to get a copy to you, possibly by granting you access to the SFU LON-CAPA server to view it there.

Regarding security concerns: the algorithmic aspect of this test improves its security compared to traditional paper placement tests. You could easily print 2000 different versions of the test.

Regarding eventual use of the test: problems can be partitioned by type, generating specific scores for each student to tell them in which areas they need support. This could help make the test adaptable for determining preparation for the different types of first-semester calculus.

Justin is looking for people who might want to use this test in the Fall term. All he needs in order to administer the test electronically for you is a list of user names (to which he will append an institution-specific prefix), after which he will generate random passwords for each which you distribute to your students. This is what they did for the pilot, which Jim Bailey says worked well. If on the other hand your students write on bubble sheets then all you need to do is provide the four-digit code from the exam and a list of numbers by which to identify the individual users and the output from the scantron machine. He can then send you the resulting test scores. Or you can grade them by hand: he can send you randomized tests along with their answer keys as a pdf. Any option is fine, but Justin would like to collect as much detailed data as possible (question-by-question results for each student).

Volunteers: Jim Bailey (CotR) and Jane Butterfield (UVic).

The meeting adjourned for lunch at 12:18pm and reconvened at 1:10pm

Math2. Participation of Alberta Institutions: Athabasca University, Red Deer College, Mount Royal University, and SAIT

Julie Peschke (Athabasca University) and Justin Gray (SFU) have met.

Math3. Calculus I and II articulation with Alberta – Jim Bailey

This is now available on www.bctransferguide.ca at:

<http://www.bctransferguide.ca/program/math>

as a special transfer agreement.

Question from Claude Laflamme: why is University of Calgary not on the list?

University of Calgary is listed as a sending institution but not a receiving institution.

Math4. Core Linear Algebra: list of Introductory Linear Algebra courses.—Jim Bailey

Jim has created a form with which to collect information about Linear Algebra courses, including a contact person, the course type, the textbook, and a topics list. The topics list is based on the table of contents of this open source linear algebra textbook: <https://lyryx.com/lscs/Kuttler-LinearAlgebra-AFirstCourse-2014A.pdf> with some additions.

Jim needs three or four volunteers to revise the form.

Volunteers: Nora Franzova, Michael Nyenhuis, Wesley Snider, and Claude Laflamme

In the middle of June, Jim will send around the finalized form to everyone so he can start collecting this data.

The meeting of the subcommittee adjourned at 1:26pm.

15. STATISTICS SESSION (please see the complete Minutes of the Statistics Session at the end)

Plenary Session

16. Highlights from the parallel sessions

Please refer to the minutes.

17. EDUC (Ministry of Education) – Nicole Arklie

The committee welcomes Nicole Arklie, who is replacing Melissa Horner.

A team of eighteen are working with a team of teachers from around the province to rewrite the curriculum.

Why rewrite the curriculum? Partly because there is a disconnect between how we are teaching and what we are teaching. In this round of rewrites, a goal is to bring those together.

New directions: increased flexibility for teacher innovation, student passions, greater depth of study. “Big ideas” (not mandated). Focus on competencies. Support for inquiry, project based, hands on. Aboriginal perspectives integrated authentically. Core competencies are the umbrella. Read more about them here: <https://curriculum.gov.bc.ca/competencies>

Three-year 2015/16 – 2017/18 plan:

The new K-9 curriculum is mandatory starting in the 2016/17 year while 10-12 is available for trial and is expected to be mandatory starting in the 2017/18 year. New provincial exams will be trialed in 2016/17 too. There will not be a new grad program by the 2016/17 year; requirements for next year are the same as this year. By July 2016 all new courses (English versions at least) will be posted and available for use. Some might be available in June. The Ministry has allowed us to circulate the most up to date version of that, which is what Jim Bailey has distributed it to BCcupms. AGPA and grad consultations recommend to the ministry that high school exams focus on Literacy and Numeracy.

Natasha Davidson asks in what way the new curriculum connects the “how we are teaching” and the “what we are teaching” that was the purpose of the rewrite.

The ministry will not dictate methodology or pedagogy; that is up to teachers. However they are writing the curriculum based on the idea that students will be “doing” more in terms of practical application rather than sitting in their seat and doing practice worksheets.

17.1 Ministry Website:

http://www.bced.gov.bc.ca/irp/transforming_curriculum.php

Some notes: if you mouse over something in blue it will give details, called “elaborations” – these are not intended to be used as a checklist or in any way mandated.

Under “tools” there are some videos, examples of lesson plans in a variety of styles.

17.2 Curriculum transformations of the senior secondary grades; personalized education pathways and implications for transitions to post secondary education.

<https://curriculum.gov.bc.ca/>

Electives:

Deanna Baxter asks: Who is the expected audience of the Geometry, Statistics, and History of Mathematics courses?

That is supposed to be based on student interest. A student who is headed for Engineering is likely to be taking the current pre-calculus and calculus sequence rather than the electives.

Michael Prunes adds that the idea behind the electives was to include mathematics courses that are not part of the calculus stream, as a way of letting students see more of what mathematics is. Not yet sure who is going to take the courses or how schools are going to offer them – the idea is to make the courses available and then find out what happens.

Currently Geometry, Statistics, and History of Mathematics are not matched to a grade level – in fact it was the desire of the designers that they not be linked to a specific grade – but because of the way the ministry computer system works it will be necessary to assign each of them as either “Grade 11” or “Grade 12”.

Glen Van Brummelen asks what the design of the History of Mathematics course will be, since it could take extremely different directions.

Michael Prunes cannot comment, as he was not involved in designing that course, and recommends reviewing the curriculum that was distributed.

Wayne Broughton asks whether the electives are finalized or might change.

In fact they will not be called “electives” but rather “optional courses after Grade 10”. These were the topics that the team felt very strongly about, but they are not cast in stone. It is unlikely that a new elective would be added but it is possible one could be taken away.

Post-Secondary transition:

Rick Sutcliffe expresses a concern that the content lists are not specific enough.

Michael Prunes comments that the philosophy behind this curriculum redesign is to move away from detailed lists, to allow teachers more flexibility in constructing their classes.

Deanna Baxter says that in many ways an itemized list is useful to us in post-secondary, so we know what we can assume our first year students know.

Michael Prunes assures us that the Foundations and Precalculus courses are not changed much at all in terms of content. There is some flexibility, but the expectation is that the courses should not have changed much.

Justin Gray asks what the prerequisites are for the Calculus 12 course.

There are no prerequisites in the curriculum structure.

Michael Prunes says that Precalculus 12 is offered at the same time as Calculus 12 in some schools, and consecutively in some schools.

JF Williams says that this will introduce more noise in terms of high school grades. He believes we will need to have entrance exams at the Universities, which means we will be admitting students without being able to tell them what courses to take upon admission.

Jan Unwin, who is superintendent of graduation and student transitions at the BC Ministry of Advanced Education, is the better person to ask. She is convinced that “no students will be harmed in the making of this curriculum”, as she puts it.

Wayne Broughton points out that the curriculum changes are much more extensive in other areas: mathematics content has not changed much. With regards to the optional courses, or with the additional flexibility now allowed, there will be fewer teachers with the background and specializations that are needed for that.

This is a typical challenge K-9 because the teachers’ backgrounds are education-focused rather than having topic specializations. But this is also the case in high schools, and was a difficulty as they designed the curriculum.

Rob Fleming says that it is important that these consultations happen not only with the specialists like us but also with registrars and admissions.

If you have any feedback please visit <https://curriculum.gov.bc.ca/curriculum/10-12> and follow the “Provide Feedback” link to email the relevant committee.

17.3 A comparison of the proposed curriculum for grades 10-12 with the Mathematics Proficiencies Report – Jim Bailey

Please see slideshow that was circulated before the meeting.

17.4 Grades and reporting. How can we provide students with high quality courses in the absence of controls or provincial exams?

Not discussed.

17.5 Dual credit.

Not discussed.

18. New business

18.1 Open Source textbooks: who is using them? Are they satisfactory?

Note: this portion of the discussion was moved to Tuesday (4pm)

- Precalculus: Nora is using Open College Algebra from OpenStax
- Calculus: Jim Bailey uses Guichard
- Statistics: Jim Bailey uses Introductory Statistics: OpenStax
- Differential Equations: Trench, DiffEqs in use (Jim Bailey, Wesley Snider)
- Linear Algebra: Jim Bailey will be using Kuttler via Lyryx starting September

Resources: My Open Math (which includes free online homework), OpenStax, BCcampus

Formats: TeX, PDF, HTML with mathjax, epub, mathml (compatible with screen readers)
Related models: shareware (author suggests a donation, which is not mandatory)

18.1.1 BCcampus – Jennifer Kirkey

18.1.1.1 Importing open textbooks such as OpenStax into BCcampus' PressReader where they can be edited.

BCcampus has chosen PressBooks, which is built on the WordPress platform, as the software that they like. They would strongly prefer that all of the open textbooks are written in that platform. The equations still don't typeset particularly well there, although it is doable. If you like OpenStax, they went for a proprietary software that is very difficult to use. Legally, you can edit their materials. Practically, it is only just feasible. What BCcampus is doing is importing everything into PressBooks gradually.

18.1.1.2 Proposals: Ancillary Materials Development

Open to faculty and staff from post-secondary institutions in British Columbia. This is to create ancillary support material for existing open textbooks that could assist faculty in adopting the open textbook, such as testbanks of questions or presentations. Deadline for deliverables is December 31st, 2016, although proposals are accepted on an ongoing basis. For more information contact opentext@bccampus.ca

18.1.1.3 Proposals: Open Educational Resource Grants

Open to faculty and staff from post-secondary institutions in British Columbia. This call for proposals is for Institutions (e.g. Teaching and Learning Centre, Library, OER Working group) in British Columbia to provide small open educational resource grants, funded by BCcampus and matched by the Institution. **Note:** your time counts as matching funds in-kind. Open Educational Resource grants may be used for, but not limited to:

- Adaption of Open Textbooks or Open Educational Resources
- Creation of Open Educational Resources
- Course Redesign using Open Educational Resources

The application form found at <https://open.bccampus.ca/call-for-proposals/open-educational-resource-grants/> should be completed and emailed to opentext@bccampus.ca Deadline for deliverables is December 31st, 2016, although proposals are accepted on an ongoing basis.

18.2 Making Mathematics Accessible to Visually Impaired Students – Tara Robertson, CAPER-BC

From print textbook to MathML. The issue of making print textbooks accessible to visually impaired students is well-studied, but what about lecture? What about online class discussions?

The process of converting a print textbook to MathML:

- Scan physical book
- Using MS Paint, remove extraneous formatting (like "Example 2" in margin)
- Run through OCR in InftyReader
- Outputs MathML – math content is tagged, which means the screenreader will read it differently. However, this all used to be hand-checked by staff to make sure it is correct.
- Instead, run through MathType to speed up that process.
- Open in Central Access Reader (free tool from Central Washington University) to export at html file.

The full path is PDF → TIFF → XML → DOCX → HTML

This is possible. It is neither simple nor automatic. Has been working with BCcampus to make sure that their open textbooks are screenreader compatible from the start.

Tara then gave us a demonstration of a screenreader reading math content such as $(A \times A) \cup (B \times B)$.

Natasha asks whether there are braille texts, as an alternate to a screenreader-compatible non-braille text.

Tara says that in K-12 they do still have full braille support. At the post-secondary level we are not funded to produce braille. She does not know of any list of resources of braille textbooks. At VIU they did produce a braille textbook for a student at a cost of several thousand dollars that was more than twenty volumes long. Visually impaired students tell her

that learning fluency with screenreader devices is a necessary job skill. There are, however, USB devices that can produce one line of braille at a time and are compatible with MathML.

18.3 The Flipped Classroom – Justin Gray

What have other schools been doing?

At Quest, been using it in Calc 1 and 2 for the past couple of years. The pure flipped model has been problematic because students cannot ask questions during a video lecture. But with the blended approach they've been using they have found that students end up better problem solvers.

Jim Bailey did it with his differential equations course. There were two students in the course, one of whom did well under the model.

Bruce Dunham has. How do you require accountability? Clickers questions at the start or online before class are helpful.

Susan Oesterle has done it with math for liberal arts students. Good discussion questions in the book they were using, so it was quite straightforward to implement.

Mike Nyenhuis has not flipped but did take screencasts of lectures, which were very time consuming and not worth the results.

Costa Karavas has tried screencasts too. Like Mike, spent a lot of time creating these extremely carefully. At the same time, another instructor created a screencast for every lecture on a very casual basis and therefore found it less time consuming.

Camosun has so many contact hours that they sort of "flip" except that rather than video lectures outside of class they have minilectures in class followed by active worktime.

Athabasca is in a sense inherently flipped: students are self-directed, and all resources are online. Students contact their tutor when they run into a question, and otherwise study alone.

Claude Laflamme flips frequently in upper level courses. Starting to do this in earlier courses too.

At North Island College, some blended classes.

Rick Sutcliffe uses a blended approach in upper level courses, which really is traditional, but has not in lower level courses.

18.4 Academic dishonesty

Not discussed

18.5 Sharing math

Gary MacGillivray has volunteered to organize Sharing Math in Calgary next year, as he has contacts there. Jane Butterfield has volunteered to assist him again. We may also try to combine it with the Alberta Mathematics Dialogue.

19. Reports:

19.1 Report from the Nominating Committee; elections for the Chairs of the BCcupms and Statistics Subcommittee if necessary.

The nominating committee reported that: Bruce Dunham accepted the nomination as Statistics Subcommittee chair and Jim Bailey accepted the nomination as Chair of the BCcupms.

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

20. Committee business:

20.1 Date and location of the 95th meeting: May 16-18, 2017 at University of Calgary

20.2 Theme for our 95th meeting

Leo Neufeld suggests: course credit.
Claude Laflamme suggests: math competitions.
Sara O suggests: grades and reporting, dual credit, academic dishonesty. (The topics from this agenda that we missed).
Claude Laflamme suggests: open texts, and Jim Bailey extends to texts for the visually impaired
Justin Gray suggests: update on calculus readiness test (this will be included in the agenda regardless of the theme).

20.3 Proposed future dates for BCcupms meetings:

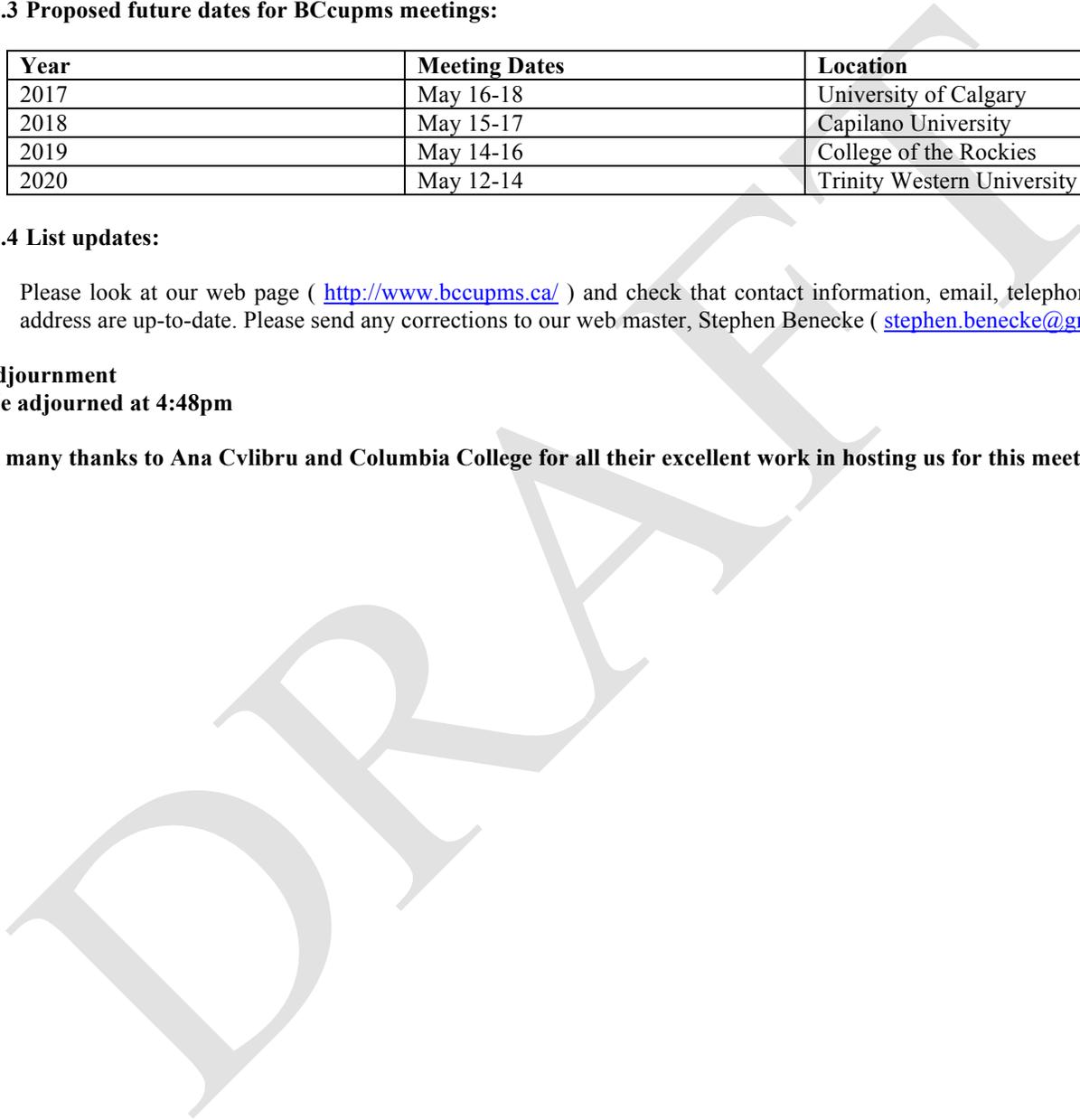
Year	Meeting Dates	Location
2017	May 16-18	University of Calgary
2018	May 15-17	Capilano University
2019	May 14-16	College of the Rockies
2020	May 12-14	Trinity Western University

20.4 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 (stephen.benecke@gmail.com).

21. Adjournment
We adjourned at 4:48pm

Many, many thanks to Ana Cvlibru and Columbia College for all their excellent work in hosting us for this meeting.



List of Committee Members Present

**Plenary Session – Tuesday, May 17, 2016 (a.m./p.m.); Secondary Teachers Session – Tuesday, May 17, 2016 (p.m);
 Concurrent Math/Stats – Wednesday, May 18, 2016(a.m); Plenary Session – Wednesday, May 16, 2011 (a.m./p.m.)**

Name	Institution	TUE	Teachers	MATH	STAT	WED
Alan Meichsner	Douglas College	x	x		x	x
Ana Culibrk	Columbia College	am	x			x
Bruce Dunham	UBC Vancouver	x	x		x	x
Chris Morgan	Thompson Rivers University – Open Learning	x		x		x
Claude Laflamme	University of Calgary			x		x
Costa Karavas	Vancouver Community College	x	x	x		x
Csilla Tamas	Langara College			x		x
Dan Henschell	Douglas College				x	am
David Leeming	University of Victoria - PIMS	x	x	x		am
David Mitton	Langara College	x		x		x
David Murphy	Simon Fraser University					am
Deanna Baxter	Capilano University	x	x	x		x
Deborah Mackie	Britannia Secondary		x			
Doug Henderson	Selkirk College	x	x	x		x
Eric Agyekum	Vancouver Island University	x	x		x	x
Erika Crema	BC Institute of Technology			x		am
Gabriela Kakushkin	Vancouver Community College	x	x		x	x
Gary MacGillivray	University of Victoria	x				
Gera Belchev	Coquitlam College	x	x	x		x
Glen Van Brummelen	Quest University	x	x	x		x
Ian Affleck	University of the Fraser Valley	x	x	x		x
Jane Butterfield	University of Victoria	x	x	x		x
Jason Schaad	Okanagan College	x		x		am
JF Williams	Simon Fraser University			x		pm
Jeannie Cameron	North Island College	x	x		x	x
Jim Bailey	College of the Rockies	x	x	x		x
Joyce Kwan	Acsenda School of Management	x	x		x	x
Julie Peschke	Athabasca University	x	x		x	x
Justin Gray	Simon Fraser University	x	x			x
Kevin Craib	Langara College	am			x	x
Laura Billing	BC Institute of Technology	x	x			
Lennart Berggren	Alexander College	x		x		am
Leo Neufeld	Camosun College	x	x	x		x
Mark Girard			x			
Michael Pruner	BCAMT		x		x	x
Michael Tang	Fraser Academy		x			
Mike Nyenhuis	Kwantlen Polytechnic University	x	x	x		x
Natasha Davidson	Douglas College	x	x	x		x

Nicole Arklie	Ministry of Education				x	am
Nora Franzova	Langara College	x	x	x		x
Patrick Montgomery	Camosun College	x	x	x		x
Paul Ottaway	Capilano University	x	x		x	am
Peter Hurthig	Columbia College	am				
Regan Sibbald	Northwest Community College	x	x	x		pm
Richard Lockhart	Simon Fraser University	x	x		x	x
Richard Taylor	Thompson Rivers University	x	x	x		x
Rick Sutcliffe	Trinity Western University	pm	x	x		x
Rob Fleming	BCCAT			x		pm
Simin Jolfaee	BC Institute of Technology				x	x
Suman Bains	Lord Byng Secondary		x			
Susan Kinniburgh	Camosun College	x	x			x
Susan Oesterle	Douglas College	x	x	x		x
Tara Robertson	CAPER-BC					pm
Tracy Wall	College of New Caledonia	x	x	x		x
Wayne Broughton	UBC Okanagan	x	x	x		x
Wayne Nagata	UBC Vancouver	x	x			am
Wesley Snider	Douglas College	x	x	x		x

*Regrets -- Nicola Valley Institute of Technology, Northern Lights College, Royal Roads, University of Northern British Columbia, and Yukon College did not send representatives this year.

Sharing Mathematics 2016
May 19th, Columbia College
Attendance

Name	Institution
Brian May	Okanaga College
Ghassem Zarbi	Corpus Christi College
Glen Van Brummelen*	Quest University
Jane Butterfield*	University of Victoria
Jeannie Cameron	North Island College
Jim Bailey*	College of the Rockies
Justin Gray*	Simon Fraser University
Karamjit Dhande	Kwantlen Polytechnic University
Mahboobeh Hosseinyazdi	Kwantlen Polytechnic University
Marie Loughin	Simon Fraser University
Mike Nyenhuis	Kwantlen Polytechnic University
Nora Franzova	Langara College
Paul Ottaway*	Capilano University
Richard Taylor*	Thompson Rivers University
Sam Pimentel	Trinity Western University
Wayne Broughton	UBC Okanagan

*presenter
Regrets: Ksenya Garaschuk (UBC Vancouver)

BC Secondary School Mathematics Contest, 2016 Report to the BCCUPMS

On May 6, 2016 the Final Round of the BC Secondary School Mathematics Contest was written at ? provincial colleges and universities. Students who had performed well on an earlier Preliminary Round held within their own high schools were invited (together with a teacher sponsor) to attend the Final Round and spend a day at the local post- secondary institution with several activities involved.

Participating institutions are:

Capilano University	(CapU)
College of New Caledonia/University of	(CNC/UNBC)
College of the Rockies	(CotR)
Langara College	(Lang)
North Island College	(NIC)
Northwest Community College	(NWCC)
Okanagan College/UBC Okanagan	(OC/UBCO)
Thompson Rivers University	(TRU)
Vancouver Island University	(VIU)
University of the Fraser Valley	(UFV)

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

Institution	Final Round		Top Three Scores		Averages	
	Juniors	Seniors	Junior	Senior	Junior	Senior
CapU	22	17	100, 97, 90	100, 86, 78	62.4	56.5
CNC	55 total		-	-	-	-
Douglas	19	16	96, 90, 87	100, 94, 85	72.4	64.4
Lang	28	13	100, 97, 88	93, 84, 82	58.8	52.5
NIC						
NWCC	8	7	90, 65, 61	57, 54, 52	50	51
OC/UBCO	50	27	85, 68, 63	77, 67, 64	42.9	47.5
TRU	36	31	68, 61, 60	63, 56, 54	36.0	35.4
VIU	47	42	75, 72, 67	81, 77, 70	40.6	39.7
UFV	68	60	84, 82, 80	87, 85, 77	46.8	43.5
TOTAL	278	213				

The top reported Junior and Senior Preliminary scores were both 60 out of 60, with averages between 20 and 40. Many schools fail to report Preliminary Round scores or participation numbers, so there is no way to know how many students participate in the preliminary round. A total of 546 students, from the nine institutions reporting, participated in the Final Round this year.

This report, together with information on winners from the individual institutions, will be posted on the BCSSMC web site http://mathcontest.sites.tru.ca/files/2016/05/MathContestBCCUPMReport_2016.pdf. (tentative as it is not up yet)

For those planning for next year, the dates we are suggesting for the 2017 contest are:

Preliminary Round: April 5, 2017

Final Round: May 5, 2017

The top three students in at the Junior and Senior levels from the 4 institutions that have submitted so far are given below. Note that participants were asked to submit a Freedom of Information Protection of Privacy Consent form in order for their names to be reported. In the following, only the names of participants who submitted a form are included, though school and grade are provided.

Capilano University

	Name	School	Grade
First Place Senior	Kevin Hu	Mulgrave	11
Second Place Senior	Yupeng Zhao	Burnaby South Secondary	11
Third Place Senior	Ryan Lu	Burnaby South Secondary	11

First Place Junior	Boya Yang	Burnaby South	8
Second Place Junior	Ji Sang You	Mulgrave School	9
Third Place Junior	Name Withheld	Burnaby South	9

College of New Caledonia

	Name	School	Grade
First Place Senior	Name Withheld	Duchess Park	12
Second Place Senior	Name Withheld	Nechako Valley	12
Third Place Senior	Name Withheld	College Heights	11

First Place Junior	Name Withheld	College Heights	10
Second Place Junior	Name Withheld	College Heights	10
Third Place Junior	Name Withheld	Kelly Road	9

Douglas College

	Name	School	Grade
First Place Senior	Name Withheld	Heritage	
Second Place Senior	Name Withheld	Pinetree	
Third Place Senior	Name Withheld	Gleneagle	

First Place Junior	Name Withheld	Centennial	
Second Place Junior	Name Withheld	Riverside	
Third Place Junior	Name Withheld	Centennial	

Langara College

	Name	School	Grade
First Place Senior	Andrew Lin	University Hill Secondary School	10
Second Place Senior	Name Withheld	Olympic Education Center	9
Third Place Senior	Yoyo Ding	Crofton House School	12

First Place Junior	Name Withheld	Olympic Education Center	9
Second Place Junior	Name Withheld	Olympic Education Center	8
Third Place Junior	Betty Huang	Crofton House School	9

North Island College

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

First Place Junior			
Second Place Junior			
Third Place Junior			

Northwest Community College

	Name	School	Grade
First Place Senior	Daelen Calder	Charles Hays Secondary	12
Second Place Senior	Name Withheld	Smithers Secondary	12
Third Place Senior	Brendon Ciccone	Charles Hays Secondary	12

First Place Junior	Name Withheld	Smithers Secondary	10
Second Place Junior	Name Withheld	Smithers Secondary	10
Third Place Junior	Name Withheld	Smithers Secondary	9

Okanagan College/UBC Okanagan

	Name	School	Grade
First Place Senior:	Yingru Wang	Immaculata Regional High School	12
Second Place Senior	Lei Bai	Clarence Fulton Secondary School	12
Third Place Senior:	Kyle Martin	Kelowna Secondary	12

First Place Junior:	Amber Phillips	Okanagan Mission Secondary School	9
Second Place Junior:	Yoonsoo Kim	Penticton Secondary	10
Third Place Junior	Yihan Xia	Okanagan Mission Secondary School	10

Thompson Rivers University

	Name	School	Grade
First Place Senior:	Sky Qi	Sa-Hali	12
Second Place Senior:	Anna Betuzzi	Peter Skene Ogden	12
Third Place Senior:	Cameron Lang	Peter Skene Ogden	11

First Place Junior:	Maggie Gu	Sa-Hali	9
Second Place Junior:	Jochebel Chua	South Kamloops Secondary	10
Third Place Junior	Soeun (Jennifer) Yun	Sa-Hali	9

University of the Fraser Valley

	Name	School	Grade
First Place Senior:	Huichoel Cho	Abbotsford Senior Secondary	12
Second Place Senior:	Cavizshajan Skanthan	Meadowridge School	10
Third Place Senior:	Josiah Plett	M. J. Mouat	12

First Place Junior:	Nick Wang	Pacific Academy	10
Second Place Junior:	Matthew Xue	Meadowridge School	9
Third Place Junior	Helen Chen	MEI	10

Vancouver Island University

	Name	School	Grade
First Place Senior	Tony Xie	Dover Bay Secondary School	12
Second Place Senior	Jacob Kim	Dover Bay Secondary School	12
Third Place Senior	Alfred Wang	Dover Bay Secondary School	12

First Place Junior	Peter Lee	Dover Bay Secondary School	10
Second Place Junior	David Wang	Dover Bay Secondary School	10
Third Place Junior	Malcolm Seyd	John Barsby Secondary	10

Report prepared on May 10, 2016 by

Shane Rollans

Department of Mathematics and Statistics

Thompson Rivers University

Pacific Institute for the Mathematical Sciences, 2016 Report to the BCCUPM

The Pacific Institute for the Mathematical Sciences (PIMS) received a renewal on its funding from NSERC for the period 2014 to 2019.

The interim Director of PIMS is Martin Barlow – Professor of Mathematics at UBC. On July 1, 2016, James Colliander will take over as Director of PIMS.

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. This is an increase of two in BC from last year. We welcome PIMS Educational Associates North Island College and College of New Caledonia.

BC 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 PIMS Education Associates:

Camosun College

In February, Camosun sponsored the BC Math Challengers (grades 8 and 9). About 75 students in all participated. This event is jointly sponsored by the APEGBC.

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. They also hosted the BC High Schools Math Contest in March. Cap celebrated Pi Day with pizza, games and door prizes in their Math Learning Centre.

College of the Rockies

COTR hosted the BC High School Math Contest in March.

College of New Caledonia

CNC and UNBC jointly sponsored the BC High Schools Math Contest in March

Douglas College

Douglas College sponsored the BC High School Math Contest again this year. There were 34 participants, 19 junior and 15 senior - with the top three in both doing very well.

Langara College

PIMS provided partial funding to support students that are in Math1190 (an MFEE course). The students present a project that they create to other students, and faculty at Langara College. PIMS funds were used to purchase supplies for the projects. Since the projects are really interesting (at least we think so) we visit a local school and show them there. This Fall we visited General Wolfe Elem. School on Ontario St. in late November. It was quite exciting to see the kids play with the puzzles and games, and it was also interesting to see my students in this environment. We will donate the more successful projects to PIMS.

Langara's other outreach includes AMC (American Math Contest). We got on the list of those that host the competition, and every year there is more and more students writing AMC8, 10, 12 with us.

Also, Langara hosted the BC Secondary Schools Math Contest - a full day of math and games and fun.

Okanagan College

Below is a brief description of 3 major math events that we were involved with this year.

On Feb. 12, Okanagan hosted Math Challengers competition at OC, Kelowna campus. About 80 grade 8 & 9 students participated in the Regional competition, and about 10 students went to Vancouver for the Provincial competition. The regional competition was partially supported by the PIMS.

On Mar. 10, the Math 160 (math for elem teachers) students hosted a math fair, again at OC Kelowna campus. They invited around 60 grade 8 students. Also, a local school who wishes to run a math fair this year. It has not run yet, but will be held some time this month (May).

Finally, on Mar. 20, one of the department members was co-organizing the Kangaroo contest held at UBCO. This was the second year he was co-organizing the event.

Selkirk College

No Report

Thompson Rivers University

TRU has been involved in a number of math outreach activities this past year:

- BC High Schools Math Contest. This being the first year of the post-Clint-Lee era, the contest was organized by a committee consisting of Richard Taylor, Suzanne Feldberg (TRU) and Paul Ottaway (Capilano U.), with help from Shane Rollans and many others across the country. TRU hosted the regional final round as usual.

- 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 the school district staff. Several TRU faculty hosted four 30-minute math enrichment activities as part of the event.

- School visits. Since November Richard has been making bi-weekly visits to South Sahali Elementary (a French immersion school) to do math activities with their math enrichment group. This is a diverse group of 9- to 12-year-olds who take class time out for this activity. Most have special interests/skills in math, but several attend because they are struggling with math -- for them, the group is a way to reinvigorate their interest in math. This activity has become very popular with students; several teachers have invited me to do extra sessions in their classrooms, of which I have 5 this year, in classes ranging from kindergarten to grade 2.

- Regional Science Fair. The annual regional science fair is hosted at TRU. As part of the event Shane Rollans and Richard Taylor hosted a series of math puzzles & games sessions for students participating in the science fair.

- TRU International Days. This annual week-long event is "an opportunity to share culture, international experience, research and interests while celebrating TRU's international community and international collaborations." As part of the event Josh Sorge and Richard hosted a walk-up games session in a prominent public area of campus. We taught passers-by to play Hex and Yavalath (simple, but very interesting strategy games) with prizes for anyone who "beat the house". This is TRU's third year doing this activity; it is surprisingly popular and well-received.

University of the Fraser Valley

Our three major initiatives this last year at UFV have continued to be Math Mania, the Math Challengers Fraser Valley Regional Competition, and the BC Secondary Schools Math Contest (BCSSMC). They have held two Math Mania events so far this year, on Oct 4 and Feb 3rd, each with 30 student and faculty volunteer hosts, and we have one more scheduled for May 25.

The 3rd annual Math Challengers Fraser Valley Regional Competition on Feb 11 attracted roughly 120 contestants from 9 schools, and UFV's 19th annual hosting of the BCSSMC attracted roughly 130 contestants from 20 schools. While the contests were being graded, we shared modular origami enrichment activities with the visiting students and teachers.

Vancouver Island University

VIU sponsored the regional BC Secondary Schools Math Contest.

Last fall, David Bigelow talked to a large group of grade 8 students at Dover Bay Secondary School about 'patterns in mathematics'.

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:

Deanna Baxter (Capilano), Jim Bailey (COTR), Natasha Davidson (Douglas), Nora Franzova (Langara), Satoshi Tomoda (Okanagan), Richard Taylor (TRU), Ian Allison (UFV), David Bigelow (VIU), Tracy Wall (CNC)

**MINUTES OF THE STATISTICS SUBCOMMITTEE
94th BCCUPMS MEETING, MAY 17 – 18, 2016
Columbia College**

Wednesday, May 18th, 2016

Present: Eric Agyekum (Vancouver Island University), Nicole Arklie (BC Ministry of Education), Jeannie Cameron, (North Island College), Kevin Craib (Langara College), Bruce Dunham (UBC-V), Dan Henschell (Douglas College), Simin Jolfaee (BCIT), Gabriela Kakushkin (Vancouver Community College), Joyce Kwan (Acenda), Richard Lockhart (SFU), Alan Meichsner (Douglas College), Paul Ottaway (Capilano U), Julie Peschke (Athabasca), Michael Pruner (BC Association of Mathematics Teachers)

Apologies for absence received from Al Fukushima (Nicola Valley), Panesh Kumar (UBC-O), and Shane Rollans (TRU)

Chair: Bruce Dunham

Acting Secretary: Richard Lockhart

1. Approval of Agenda

Motion to approve agenda: Moved: Paul Ottaway; seconded: Gabriela Kakushkin. **Carried unanimously.**

2. Approval of minutes of the Statistics Subcommittee Session of the 93rd meeting.

Motion to approve minutes: Moved: Richard Lockhart, seconded: Paul Ottaway. **Carried unanimously.**

3. Matters arising from minutes

The chair discussed outreach and professional development for K-12 teachers who might be wanting or needing to teach statistics in the schools. There is hope of enlisting support from the Statistical Society of Canada to develop materials for use in a teachers' professional development workshop. Michael Pruner (BCAMT) was very supportive of such a proposal. There is an October province-wide conference of teachers in the Lower Mainland which will have a good turnout and that would be a good one for a statistics session. He also asked for support in reviewing the grade 12 statistics course. The length of a possible ProD workshop aimed at high school teachers was discussed, and it was thought half a day was the minimum but up two days could be preferable.

4. Institutional Reports

Acenda School of Management

Originally established as a Business School offering a Bachelor of Business Administration (BBA) degree program, Acenda School of Management is expanding to offer a new Bachelor of Hospitality Management degree (BHM) program in 2016, starting to accept students from April 2016. This additional degree program (BHM) will increase the enrollment in math courses, BADM 120 (Business Math), BADM 221 (Fundamentals of Economic and Business Statistics) and BADM 222 (Management Science) as these courses serve as a prerequisite for upper-level courses in both the BBA program and the BHM program.

There have been some minor modifications in the syllabus of BADM 221 in the current term. The topics covered in this course though have previously matched at least 76% of the suggested core topics in the "Introductory Statistics Transfer Credit Proposal" for BCcupms (by Julie Peschke, Athabasca University), and from now it will further include "correlation and (simple) linear regression" and its analysis so that it will increase the topic matching percentage to 90%. The course has a wider application in Business and Economics and is a prerequisite for many courses at Acenda, such as Management Science, Operational Management, Business and Marketing Research, and Production Management.

As Acenda emphasizes "international thinking and individual focus", the class sizes will keep in a typical size from 8 to 30 students in the math courses.

Athabasca

There are three courses offered, two being first courses. One of the courses uses Minitab. Neither of the introductory courses requires calculus. The follow-up course includes topics such as ANOVA and regression. All courses are offered on-line,

and total yearly enrollments are around 200 and 1800 respectively for the introductory courses. The new, second course enrolls about 75 a year, and uses the software SPSS.

British Columbia Institute of Technology

Specialists in math and stat at BCIT teach about 20 statistics courses, but some programs have their own statistics courses. There are a couple of intermediate-level statistics courses, but most courses in the field are introductory statistics. Software adopted includes R, Excel, and Minitab, and over the last year there has been a move to use R more. Some open textbooks have been used.

Camosun College

The college followed the footsteps of three quarters of the BC post-secondary institutions and relabeled statistics courses to STAT from MATH in the September of 2015 after the department name was changed to Mathematics and Statistics a year earlier. There was an increase in the offering of Stat 216 (Applied Statistics) by one section in 2015/16 and also an increase in enrolment in the Stat 116 (Elementary Statistics). The enrolments in Stat 218 (Introduction to Probability and Statistics I), and Stat 219 (Introduction to Probability and Statistics II) changed little. A new Statistics course Stat 157 for Information and Computer Systems has been created. Stat 254 continues to be part of the Engineering Bridge programs to UVic and UBC. The department has experimented with the open source online assignment system WeBWork in Stat 116 and Stat 216, and continues to use R for the bi-weekly computer labs of Stat 216, 218 and 219, and MegaStat add-ins for Excel for Stat 116 computer labs.

Capilano University

One course for engineers is offered, and one for general arts that is often taken for nursing preparation. No software is used in these courses, but graphing calculators are adopted. There is a feeling of being left behind in the teaching of the discipline, although the institution is in the process of hiring a statistician which would bring the total number of faculty in the field up to one.

There is some prospect labs may be added to courses, which may also be renumbered and change credits. There are steady enrollments, with courses full at around eight sections of 40 (although the class cap is 35).

Douglas College

Enrollments for the elementary statistics (non-calculus) course remain stable (16 sections/600 students). The calculus-based course offering experiences more modest demand (1 section/year) but also has stable enrollments. Two new courses are under development: (i) An elementary statistics course for the biological and health sciences. The course will be similar to the existing MATH 1160 with a biology and nursing focus; and (ii) An applied statistics course. The course is a continuation from elementary statistics: more regression, ANOVA, non-parametric methods. This course will be non-calculus based.

Langara College

The statistics area at Langara College is currently comprised of 13 faculty members (10 FT, 3 PT). In 2015, the college offered 69 sections of statistics courses to 2,236 students (1,646 domestic, 590 international). This total included 58 sections of introductory courses and 11 intermediate level courses. The 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) exhibited the largest enrolments. Statistical software packages that are used in both introductory and intermediate level courses include: StatGraphics Centurion and MS Excel.

Nicola Valley (in absentia)

NVIT continues to offer two stats courses, STAT 203 and BUSM 207, which are identical courses offered in different programs.

North Island College

NIC has one statistics course, MAT 115. This is an algebra-based course that serves life science, business, and criminology students. There are approximately four sections per year with three at the Courtenay campus and one at the Campbell River campus, as well as a distance-learning option.

Simon Fraser University

SFU Statistics and Actuarial Science experienced some modest enrollment declines due to ENSC dropping STAT 270 in favor of their own course. Sociology and Anthropology are about to drop the service course STAT 203 and that will decrease enrollment further. Enrollments in the minor are much higher over the last two years because a route to the minor has been created with weaker mathematics and theory requirements.

There is a move to eliminate a number of restrictions which prevented students who had taken statistics in other departments from taking STAT courses. It will also be possible for STAT 100 to be taken after other STAT courses.

Two new lower division courses, STAT 180 and STAT 240, have been introduced. STAT 180 is a 1 credit seminar course on career development with weekly speakers from government and industry. STAT 240 is Introduction to Data Science; it is designed to get lower division statistics students to see real data earlier and has a big computing component.

There is also a new big data course, STAT 440.

The major has, until now, required a minor in another discipline but this is weakening to 12 credits, barring MATH, ACMA, and MACM from being used to meet this requirement.

In faculty news, Rick Routledge has retired and Robin Insley will retire at the end of August. Marie Loughin is now doing a reorganized version of Robin's job.

Thompson Rivers University (in absentia)

There are three things to report:

1. The new statistics hire, Xiaoping Shi, is working out well and received an NSERC grant.
2. The process of creating a Masters of Data Science degree is well underway.
3. Enrolments are good but there are continuing struggles with the Tourism Department, who now want to switch their program statistics requirement from STAT 1200 to a statistics course taught by the Geography department. Their stated reason is that they want their students to take a more applied course, which suggests that they have never even looked at the content of the STAT course. Math and Stats faculty are vigorously opposing the move. The question goes before the Academic Planning and Priorities Committee of Senate in May and there may have been a decision before the BCCUPMS meetings. The case is being presented by the Associate Dean, Dennis Acreman. If the decision is unfavourable, one or two sections will be lost.

University of British Columbia, Vancouver

Numbers on the Statistics program continued to rise over the past year with a total of 51 students graduating since May 2015, this being a record high. Enrolments are expected to increase further due to an influx from Vantage College, a new access route for overseas students from which approximately a third of the sixty entrants last year opted for a statistics specialisation on entering their second year. There are some concerns that the capacity on certain STAT courses may not meet the demand for places.

A proposal has passed this year to drop MATH 200 (multivariable calculus) as pre-requisite for STAT 241/251, the calculus-based introductory course in probability and statistics for engineering students. The new pre-requisite is now just MATH 101 or equivalent. The department has voted to attempt to move forward two further curriculum changes next year: (i) Add a credit exclusion between STAT 200 and STAT 241/251 and (ii) Remove the credit exclusion between MATH/STAT 302 (introductory probability) and STAT 241/251. The credit exclusion between MATH/STAT 302 and STAT 241/251 hinders students from applied science programs wishing to transfer to a statistics pathway, as such students are presently required to take 302 for no credit.

The final year of funding from UBC's Teaching and Learning Enhancement Fund (TLEF) for the WeBWorK project saw the software introduced in STAT 344 (Sample Surveys). It is expected that additional funding will support the development of further questions in STAT 344 and STAT 305 (Introduction to Statistical Inference). The Flexible Learning project, also funded by TLEF, has progressed in the past year, developing applets, videos, in-class activities, and WeBWorK questions for introductory courses. All resources created will be open-source, and made freely available.

In a joint venture with Computer Science, the new "Data Science" professional masters program has been approved for launch in September 2016. The enrolment for the initial intake will be limited to around twenty, with an increase expected for the subsequent year. A new course code, DSCI, has been approved.

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

VCC currently offers only one statistics course: Introduction to Statistics course (MATH 1111). It is experiencing very high enrolment with students seeking entrance to Health Science programs. The number of sections has increased to six sections a year. The textbook used for the course is *The Basic Practice of Statistics*, 7th edition, by Moore *et al.*, 2015 edition. Software MS Excel 2010 is used as a supplementary tool in teaching.

A new 1st year certificate program in Environmental Studies (three concentrations) is under development. It will provide the option to VCC students to complete their 1st year courses at VCC and then transfer by either assured or competitive admission to programs in SFU's Faculty of Environment. The *Environmental Resource Management* and *Global Environmental Systems* concentrations will require the Introduction to Statistics course MATH 1111. The new certificate is projected to start in September 2016.

Vancouver Island University

There are two level 100 courses: one for social sciences, the other for forestry and fisheries. Excel is used in the course for forestry, fisheries. A calculus-based stats course was offered last year. An open textbook has been trialed. There are three upper level courses, with R adopted in two of them.

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

With the proposed incorporation into the BC transfer system of certain courses from Albertan institutions, and ahead of the 2017 joint meeting of BCCUPMS and its counterpart in Alberta in Calgary, Julie Peschke proposed content a generic introductory statistics course. If the committee could agree on the core content of introductory statistics courses, it would make articulation of such courses far easier. Moreover, identifying proposed core content would be a helpful guide for any institution creating a new statistics course.

The document presented by Julie, and circulated prior to the meeting, contains lists of topics for both a proposed core content and additional, optional topics. For articulation, guidelines suggest one course must cover at least 70% of the other, but presumably for a standard introductory course at least some content is deemed essential.

There was a brief discussion of the proposed core content. Although time prevented all from expressing their views, some opinions were voiced that the core content appeared to include too many topics, and that some of these should be moved into the “electives” list.

The chair volunteered to communicate with Julie the topics he considered would be better suggested as electives. Other members present were also invited to provide input. It was agreed that a further discussion would be appropriate at next year’s meeting.

6. Provincial Minitab license (Bruce Dunham, UBC)

The issue of a possible provincial-wide license for Minitab has been raised again, as apparently Minitab are prepared to offer such a license, at least to institutions in BCCUPMS. The chair has attempted to follow up on this, with emails to BCNet, who apparently administer a similar license for Maple. There had been no meaningful progress, but the chair informed that he would do what he could to at least obtain information about how such a license operates.

7. Handling academic misconduct (Kevin Craib, Langara)

Langara has experienced an increase in reports of academic misconduct during 2015. To minimize cheating during tests, Kevin described some of the measures he has adopted including: randomized seating assignments, use of solo exam dividers, and using multiple versions of tests. Kevin also reported he suspects that some students try to swap papers when his back is turned. Using more invigilators helps to mitigate this activity.

8. Proposed new grade 12 course

A new Statistics course at grade 12 has been proposed by the Ministry of Education. The course will be an elective with no formal pre-requisites. It is likely the new course will be offered starting in the 2017/18 academic year. The BC Association of Mathematics Teachers would like to work with postsecondary faculty to develop this course, and if possible obtain support for teachers running the new course.

9. Any other business

There was support for Bruce Dunham continuing as Chair of the Statistics subcommittee. As there were no other candidates, Bruce would be unopposed in his re-election to the post.

10. Motion to adjourn

Moved: Richard Lockhart, seconded: Paul Ottaway. **Carried unanimously.**