THE BRITISH COLUMBIA COMMITTEE ON THE UNDERGRADUATE PROGRAMME IN MATHEMATICS

MINUTES OF THE 77TH MEETING, MAY 27-29, 1999

THURSDAY, MAY 27, 1999

1. WELCOME BY THE PRESIDENT OF OKANAGAN COLLEGE - Dr. Katy Bindon

Dr. Katy Bindon brought us greetings and challenged us to look at how we bridge high school to university mathematics. She also complimented us on having the most inaccessible acronym of all articulation groups.

2. ADOPTION OF THE AGENDA FOR THE 77TH MEETING OF THE BCCUPM

The Agenda for the 77th Meeting was adopted with the following changes: 2.1(b) on Friday will be moved to Thursday at 2:30 and the Thursday evening session with Secondary teachers will be held at 4:30. Allan Cooper has submitted a motion that will be considered on Saturday. David Lidstone asked if there had been any thought given to changing the name of the committee to include S*tatistics*. Leo - this could be discussed on Friday.

3. ADOPTION OF THE MINUTES OF THE 76TH MEETING, HELD AT CAPILANO COLLEGE

The Minutes of the 76th Meeting were adopted with the following corrections: Open Learning Report #3; Dr. Twinman should be Dr. Tuinman.

4. CORRESPONDENCE

David Leeming sent us an e-mail with his greetings and regrets for missing the meeting.

5. ANNOUNCEMENTS

5.1 **Notice of Elections:** At this Meeting, an election for Vice Chair and for Secretary will be held.

5.2 Chris Bose announced that the PIMS Problem Solving Session will be held in Victoria next week. This is focused on graduate student training. We should encourage graduate students to take part in this in the future.

6. CALCULUS SESSION AND STATISTICS SESSION (held concurrently ...the Statistics Report follows)

Calc1. Calculus Panel Discussion: Technology, Reform and Influence of Student background. Panelists: Chris Bose (U.Vic.), Rick Brewster (Capilano), Sylvie Desjardins (OUC), and David Lidstone (Langara).

Charles - to Chris: How long are the multiple-choice exams and how do the students like it? Chris - students have accepted it with very few students complaining. A typical final would have about 30 questions in 3 hours. The questions are similar to ones students would have seen on homework. Questions are designed to make it difficult for students to "work backwards". Midterm exams are a mix of multiple choice and long answer (only finals are **all** multiple choice). Exams are graded either right or wrong.

Susan O. - to Rick: Is the one credit lab mandatory? Rick - the students must register in a lab section that is graphing calculator based.

Fae - to Rick: Could the lab work have been done within the four hours (without a separate two-hour lab)? Rick - because students come in with a variety of backgrounds and goals, there could be transfer problems. To go back to only four hours would mean something would have to be omitted from the course.

Ken - extremely disturbed to hear about 100% multiple choice final exams. We have been concerned that students can't think and write mathematically. Chris - agrees with what Ken says, however this system avoids students getting partial credit and passing a course without ever getting something right. Performance of students on the multiple-choice questions is better than on open-ended questions. Ken - doesn't see that multiple choice exams are a good way to avoid giving part marks.

James - what are the failure rates in each of the approaches to Calculus I? Chris - under 20% failure and about 10% drops. Rick - around 20%. Sylvie - in Ottawa the failure rate was 20 -30%. David - the rates are not very different from the regular streams (30 - 40%). James - do these initiatives show a drop in failure rates? David - the reform approach meets the needs of students who are not prepared for a traditional stream, but not all students make the appropriate choice.

Tony - multiple choice marking eliminates the disparity between different marking styles. Also, why are the students doing better on the multiple choice? Chris - the questions are similar to what they have done on homework. Also, multiple choice is not amenable to multi-step questions, so there is little linking between components of a question. Bill - was this a philosophical choice of the math department or an economical choice? Chris - it was not a philosophical choice - student enrollment has gone up, the number of faculty has decreased and student support has decreased. It has definitely been economically driven. Alan - was any comparison done between the same questions posed as long answer or as multiple choice. Chris - no study was done to compare approaches. Neil - has any analysis been done on midterms with both long answer and multiple choice?. Chris - no correlation has been done. Howard - have you noticed any change in Math 200 success rate since the implementation of the multiple-choice exams? Chris - wasn't involved at the start, so not in a position to compare.

David - calculators are required for exams - do you restrict the type of calculator? Chris - it hasn't been a problem - the students seem to have the appropriate calculators. In a typical class a few students would have an inappropriate one which is taken and replaced with one the instructor has brought.

Ken - it is very difficult to make good "incorrect" responses on multiple choice, so this could be why students do better on multiple choice. Chris - it is always a challenge to make up good multiple-choice questions. Sylvie - students may do better on multiple choice because the course has been streamlined. If technology hasn't been a part of the course and the emphasis is on the final answer then we are doing our students a disservice.

John - U Vic uses no technology in 1st year. Why, when the high schools and most other colleges are? Chris - the students don't complain that the technology is not there. The department hasn't done more because it doesn't have access to the technology.

Leo - how do we make math more relevant to students or how do we involve them in a greater part of the mathematical process? Can we assign students projects that require some "digging"? Students learn much more and remember better if they are assisted to engage themselves fully in the process.

Judy - what would a typical exam question look like in a reform course? Sylvie - the question would not necessarily be something the student has seen before. Some questions might ask the student to set up a question, but not necessarily answer it. Judy - what would the 10% difficult questions look like? Chris - use the chain rule in an integral setting or combining two concepts that they have not seen combined before.

Alan - when you set up a matrix for a question, what would the answer field look like? Chris - the answer field on his exams is the same for every question. Alan - likes using technology, but does not agree that it is essential. He worries about what it does to the perception of the subject and what it does to some students. For students who are not comfortable with technology it makes it unfriendly.

John - what is our goal in teaching mathematics?

Susan M - tired of talking to intelligent people who remember **nothing** from the course. Most of our students take one course - they should all know when to use a derivative, not just a computation. We have various groups of students, some of whom need a "right answer" - she would like her students to know what dy/dx **means**. Rick - agrees with Susan - focus should be on what we want our student to come out knowing - can we get into more problem solving? Are there some areas of math we could focus on that lend themselves to this approach?

Malgorzata - technology is a tool we can choose to use or not, but technology is not mathematics. Mathematics is teaching a way of thinking - one of the greatest thrills is having students say that they can *understand* mathematics and not just *memorize* it. Students learn technology in many other settings and we would have to give something up if we add the use of technology. SFU does not use technology for financial and logistical reasons. How do we integrate technology in a *meaningful* way? Sylvie - with graphing calculators students can look at the first and second derivatives and understand what is happening with the function. Students can analyze more because they don't have to do as much routine computation.

Slava - student success is a function of how much time they spend at home. She gives surprise quizzes, but they add a lot to the marking load.

Calc2. Calculus Course Changes at UBC - Charles Lamb

The course changes are starting in September. 100/101 is calculus for the physical sciences and engineering (153/154 no longer exists). 102/103 is calculus for the life sciences, which existed before under 100/101. 104/105 is calculus for commerce and social science. 120/121 is the honours stream, which remains unchanged. 100/101 and 104/105 are meeting 3 hours per week (were 4 hours per week).

102/103 will have 3 hours per week and a biweekly computer lab. The first time it was offered only a few students signed up for this course when it was a section under 100/101. The second time it was offered it wasn't advertised - students didn't know they were going to have a lab. This year it was offered with a "lab" advertised (not a "computer lab"). The lab is on the Internet, so it is in theory accessible from home. There is also a scheduled lab for students who do not have a computer at home.

100/101 will use *Edwards and Penny*. Engineers, who are block registered, have to take this course. 102/103 will have course material on the Internet.

104/105, which replaces 140/141, will stay with *Hassler and Paul* with some supplementary material from *Edwards and Penny*.

Any of these sequences can be used as prerequisites for any further calculus courses. Students can change from one stream to the other after first term and can only get credit for one of 100, 102, 104, 120. There was a perception that 100 was harder that the old 140, but experience showed that students grades from high school dropped about the same amount for both streams.

All of these sequences will have a common core - individual instructors will have more freedom outside the core. What will be included on the finals will be a matter for discussion among the instructors.

Leo - what are the prerequisites? Charles - a C+ in Principles of Math 12. This was the prerequisite for Math 100, but not for Math 140. Leo - why were hours reduced to 3? Charles - Martha Piper wants to bring more research into the University. Also, there was pressure from the applied sciences to reduce the number of hours for their students. Within the department, there were mixed opinions about the reduction in time.

Alan - what was the rationale for bringing the technology into the life science stream? Charles - it was already there. They would like to bring it into all the courses, but it was a matter of resources.

Chris - are the 3 hours per week standard lecture format? Charles - yes, it is lecture and there is no tutorial. About 1/3 of 100/101 sections will have 4 hours (rather than 3) under "Extra Sessional Studies". Graduate students or visiting professors teach these sections.

David - to what extent will Taylor Polynomials and series be covered? Also, how will the core provide preparation when 140/141 did not? Charles - trig was downplayed in 140/141, so the students were not really prepared for Math 200. The new core should provide what is necessary.

Susan O. - Douglas is changing to early transcendentals. Using *Edwards and Penny* would require jumping around a lot. Charles - not sure what the process was for choosing a text. All the choices will require a certain amount of jumping around, especially since there will be a core with particular streams adding their own topics. Malgorzata - SFU changed to *Edwards and Penny*. Students were chosen to look at the books and students chose that one. They will now have to decide to stay with their current syllabus or to change the courses to match the text. Changing the syllabus effects transfer credits, so they will be talking to the other universities.

Sylvie - will UBC have a policy about graphing calculators? Charles - UBC has never had a general policy - it has been course specific. Next year they will allow graphing calculators for all the streams, but it is not a department policy. UBC has not wanted to say that you **must** buy a graphing calculator. When they have allowed graphing calculators, the exam has been designed so the calculator is absolutely no use.

Howard - will UBC include compound interest and annuities in 104/105. Charles - some will be included, but not as much as before. They will include up to present and future values. In second term they may include an improper integral.

John - are you assuming the colleges will follow UBC's sequence .. for example, Taylor Polynomials in the first term? Charles - It could be a problem for students transferring after first term. He is not prepared to give the final answer. John - what about high school students with AP Calculus, which does not include some of those topics? Charles - it could also be a problem. Ken - there's never been 100% match on courses - they should have transfer credit if there is a 90% match. The colleges can tie themselves in knots trying to match the universities. Charles - they have tried to be reasonable and have never required a 100% match, but he can't make an official reply now. Bob Adams and Charles handle transfer issues for UBC.

Leo - is there any plan to look at all transfer credits? Charles - no - if there is a transfer agreement in place now it should not be a problem. Leo - will students get generic transfer credits or will they be assigned to 100/102/104/120? Charles - students will continue to get transfer credit for different streams. David - there seems to be some inconsistency in your decisions about transfer credit. There are also inconsistencies between the 3 big receiving institutions. UBC needs to be far more liberal around its agreements for transfer credit.

Ken - read a memo from Bob Adams regarding articulation and transfer credits. Who will be looking at transfer credits? Bob will consult with Charles on any 104/105 transfer issues.

John - has the sequence of topics been taught in this order yet? Charles - no. John - if you change back will the colleges have to change back as well? Charles - doesn't know how to answer that question.

Calc3. Conclusions, Recommendations and Summary.

2.1 b) Transfer Innovations - Finola Finlay

About three years ago the ministry brought out a Strategic Plan (with no consultation with the universities). Finola talked to the authors who said that there were some problems with transfer and that there should be block transfer. There were a series of consultations with the post secondary system with over fifty responses. Do you believe the transfer system is broken? Which of these options would work? Should there be a legislated solution? The system responded that generally the system is working, with a few problems. Yes, they would like the ministry to pursue solutions. No, they would not like a legislated solution.

Every year thousands of college students are contacted in the Outcomes Survey. For three years in a row, 16% of students reported that they had problems transferring. There has also been qualitative research, involving talking to students personally and in focus groups. Students range in their knowledge of the transfer system from sophisticated to clueless. BCCAT found that lots of students know exactly what they had to do, but said that the information was hard to get and was not user friendly. BCCAT also looked at students' transcripts and found that 85% of their courses received transfer credit. The other 15% did not get credit because the course was not articulated. Usually, the course received more credit at the sending institution than at the receiving institution. In the Faculty of Arts at UBC, 40% of the courses received unassigned credit.

The Council believes there is a need to improve the transfer system. There is one overwhelming concern about increased complexity in the past 10 years. There are now 14 degree granting institutions while 10 years ago there were only 4. There are more and more options for students, which makes transfer more problematic. If everyone is diverging it makes it more difficult for students to move through the system.

The Council has established a standing committee to look at other ways of doing transfer in B.C. They are promoting 3 solutions: 1) Flexible Pre-Major, 2) Descriptive Pathways, and 3) Block Transfer.

1) What are the requirements necessary for acceptance into a major in third year? The goal is to reach an agreement on a single set of courses that each receiving institution would accept in lieu of its own specific course requirements. Is the student sufficiently prepared to enter a major program with reasonable prospects of academic success? vs. Do all students have identical or very similar courses? What background can be accepted in lieu of required courses? There needs to be more flexibility in the system. This would be suitable for disciplines for which several institutions are offering the degree, the pre-major is diverging, or the major can accommodate a variety of approaches in the pre-major. The Council stresses the principle of voluntariness in its support for all transfer innovations.

2) Descriptive Pathways is the second model. A subject or discipline "grid" which outlines requirements and courses. This does not involve reaching agreement on curriculum.

What will the money cover? Finola - travel to a meeting, release time for someone to write a report, etc. If a committee wishes to put in a proposal other that what was presented, BCCAT will also consider it. David - would BCCAT accept proposals looking at smaller packages? Finola - yes, if you can show that it would improve transfer. The number of students or courses involved would affect the priority it would be given.

Judy - has BCCAT made any attempt to meet with the universities directly? Finola - BCCAT represents both sending and receiving institutions, so the universities are on the Council. Leo - the paradigm of sending and receiving is changing. Nearly all institutions are now both sending and receiving. The committee has significant opportunities, even though we have a good record with course by course transfer. Finola - if there is interest, we should form a sub-committee and she would be happy to work with it to submit a proposal.

7. REPORTS FROM CALCULUS AND STATISTICS SESSIONS

STATISTICS

1. Recognition of Statistics as a Discipline

Given that

- Statistics is not a branch of Mathematics but has its own theory, tools, etc.
- It is important that we, the post-secondary institutions, have a forum to communicate with one another about our Statistics courses, their content and articulation to better serve our students.
- That it is important that we liaise with high-school teachers about the teaching of the data-analysis strand of Math 12 in preparing students for our courses.

We endorse Recommendation 11 of the Math Proficiency Report (Feb 99) that a forum for communication and articulation of Statistics courses be established.

Different models were considered. The one with the greatest support was a name change to BCCUPM&S with a Committee on Mathematics and a Committee on Statistics.

We further recommend that there be a minimum of 2 people from each institution and that in each institution, a Statistics person be identified to aid in communication and dissemination of information.

2. Software

Given that the availability of technology has enabled and informed the way we teach, we recommend that the BCCUPM investigate the possibilities of provincial site licenses for SPSS and Minitab in order to greatly improve our access to these software packages.

3. Activities Component

Given that Statistics is a hands-on discipline, that students understand and retain more by activities, we recommend that computers, manipulables, etc. be an integral part of Statistics courses.

Susan M - having two people going to meetings could be a problem for some institutions. Veda - we would not necessarily need to send two people, but should have a calculus person and a stats person identified at each institution. Finola - would advise against setting up a separate committee, because it would have to have approval from **every** institution. Money allocated for articulation is handled differently by different institutions. It is up to us to convince our institutions that statistics deserves to be articulated.

Slava - can MapleV work for stats. Veda - no, it's not appropriate.

Motion: that each institution be encouraged to have a Statistics person identified to aid in communication and dissemination of Statistics information.

Carried

Motion: that this body create a Sub-Committee on Statistics.

There was some discussion around the logistics of setting this up and who would chair each sub-committee and the combined meetings. Our next few meetings could be dedicated to looking at the mandate of this committee and whether we are on track. There could also be some issues around the constitution of this group.

Carried.

Motion: that this body change its name to the B.C. Committee on the Undergraduate Programs in Mathematics and Statistics.

Motion: that this motion be tabled.

Carried.

Motion: that the BCCUPM investigate the possibilities of provincial site licenses for major statistical packages including SPSS, Minitab, and SGP in order to greatly improve our access to these software packages.

Software - some concerns were expressed regarding colleges/universities that use other programs and may not want to change. A question was raised regarding who would do this investigation, how many students would use the programs, etc. There are two agencies in B.C. that look into these issues who would do the work for us.

Carried

CALCULUS
A summary of the discussion (as it appears in the minutes) was presented.

The Thursday Session of the BCCUPM adjourned at 4:30 p.m.

THURSDAY, MAY 27TH, 4:45 p.m. (Meeting with Secondary Teachers)

BC High School Mathematics Contest Report (written by Jim Totten and presented by Rick Brewster)

On April 30, 1999 the final round of the BC Colleges High School Mathematics Contest was written at 9 provincial colleges. 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 the local college with several activities involved.

This year there was participation from:

Camosun College	(Cam)
Capilano College	(Cap)
College of New Caledonia	(CNC)
College of the Rockies	(COTR)
Langara College	(Lang)
Malaspina University College	(MUC)
Okanagan University College	(OUC)
University College of the Cariboo	(UCC)
University College of the Fraser Valley	(UCFV)

The following numbers of students participated in the Final Round through each of the local colleges:

	Prelim		Final		Final	
	Junior	Senior	Junior	Senior	Top 3 Marks	
	std/sch	std/sch	std/sch	std/sch	Junior	Senior
Cam	150/9	50/6	14/6	12/5	96,95,93	59,51,48
Cap	89/9	137/9	27/9	35/9	100,93,90	88,83,81
CNC	257/11	85/11	29/11	17/11	61,60,56	63,59,34
COTR	100/2	60/2	4/1	4/1		
Lang	265/6	265/6	33/6	39/6	100,98,95	88,85,82
MUC	312/7	121/7	30/7	24/7	80,68,66	53,48,46
OUC	780/29	410/29	46/26	38/26	90,79,76	55,53,50
UCC	338/18	217/15	47/17	40/15	77,77,65	57,41,38
UCFV	550/11	60/11	28/8	15/8	98,88,79	61,55,42
Total	2841/102	1405/96	258/94	224/88		

Thanks should go to those who have been involved in organizing their own college faculty to get on board, and have also been actively enlisting the local teachers to encourage involvement of their high schools. While I don't have all the names, I will list those whose names I do know: Wayne Matthews at Camosun College; Rick Brewster at Capilano College; Judy Malcolm at College of New Caledonia; Jim Bailey at College of the Rockies; Dave Lidstone at Langara College; Patrick Ng at Malaspina University College; Clint Lee at Okanagan University College; Susan Milner at University College of the Fraser Valley; and Jim Totten at The University College of the Cariboo.

Furthermore, we should thank the problem posers who either submitted problems or came together at OUC last August to put together the initial draft of all four contest papers: Jim Bailey (COTR), David Murray (OUC), Clint Lee (OUC), Don DesBrisay (UCC), Judy Malcolm (CNC), Alan Cooper (Lang), Kirk Evenrude (UCC), Wayne Matthews (Cam), Nicholas Buck (CNC), Edward Dobrowolski (CNC), John Grant McLoughlin (Memorial University of Nfld. -- formerly OUC), and John Ciriani (retired -- formerly UCC). It is worthwhile noting that we continue to get significant contributions from John Ciriani and John Grant McLoughlin, neither of whom are associated with any institution involved in the process. I understand that the process was again highly energetic and a lot of fun. We would like to see people from other colleges involved as well -- it isn't fair that only the above should have all the fun! Next year's contest papers will have been drafted by the time this report is filed. Others can report on its success.

Yet another group to be thanked were those who proof-read the contest papers and offered solutions for the questions: Nicholas Buck (CNC), Edward Dobrowolski (CNC), David Murray (OUC), Don DesBrisay (UCC), Kirk Evenrude (UCC), Wayne Matthews (Camosun), Judy Malcolm (CNC), John Grant McLoughlin (Memorial), and Jim Totten (UCC). Special thanks also to Clint Lee, who took on the thankless task of preparing full solutions for all the questions, and had to put up with a lot of nit-picking. Last, but not least, the most onerous job went to Rick Brewster who took on the task of not only type-setting all four contest papers, but had to then coordinate feedback coming from so many different proof-readers, all suggesting different (sometimes conflicting) ways to improve questions.

Clint Lee (OUC) very kindly billeted all of the out-of-towners who participated in creating the initial drafts of the contest papers back in August and hosted a barbecue at his home (third annual?) to provide a social break for all.

Apologies to anyone whose name may have been inadvertently left out.

The tentative dates for next year's contest are:

Preliminary round	Wed. March 8/99 (in the schools)
Final round	Fri. April 28/99 (in the colleges)

Delegates and teachers enjoyed a lively, productive discussion of relevant philosophical and practical issues facing math educators. All enjoyed the generous reception that followed.

FRIDAY, MAY 28, 1999

1. WELCOME BY REPRESENTATIVE OF OKANAGAN UNIVERSITY COLLEGE - Dr. Derek Muggeridge.

Derek Muggeridge was ill so Eric Buckley welcomed us to Okanagan University College.

Agenda Changes: The Transfer Innovations item was not completed yesterday, so we will discuss it under *New Business.* The motion from Alan Cooper will also be discussed under *New Business.*

Motion: that Jean MacLeod continue as Secretary and Jack Bradshaw continue as Vice-Chair.

Carried.

Notice of Motion was given for an Interim Chair of the Statistics Sub-Committee.

Veda Abu-Bakare was nominated and acclaimed as Chair of the Statistics Sub-Committee.

2. REPORTS

2.1 B.C. Council on Admissions and Transfers

a) Recent BCCAT Initiatives - Eric Buckley

Eric reported on the *Forum on Transfer Innovations*. David - what are the responsibilities of colleges to accept transfer students from outside B.C.? Some of the institutions that were previously only sending are now also receiving - Langara receives transfer requests from all over North America, Europe, etc. Eric - not really able to answer that question. Richard - has any thought been given to setting up a "model" course and then any course that has a minimum (80%?) match would be given transfer credit? Leo - it has been discussed, but no decisions have been made. Alan - he seems to remember that second hand transfer credits were "flagged". Veda - OU has a service that will assess courses/credentials from other places and inform students of the equivalent B.C. courses.

b) Transfer Innovations - Finola Finlay (see page 4)

2.2 BCAMT - Garry Phillips

The BCAMT has been concerned about what numeracy is, so they have produced a pamphlet on numeracy issues. They will also be sponsoring numeracy conferences. In society, it seems acceptable for people to say they "can't do Math" and the BCAMT would like to assist in changing such attitudes.

They are involved in a Task Force on Mathematics, which Bruce will address later.

They are also involved in a Geometry, Space and Shape Committee. B.C. is involved in the Western Canada Protocol, which has some gaps in the Geometry area. The committee will make recommendations to the Ministry (who also have a committee looking at the WCP). They feel Geometry should be included at the Grade 12 level.

They have been forging links with PIMS. They are sponsoring the MATHCOUNTS contest, which is currently mostly in the lower mainland and the island, but they would like to see involvement extended to the rest of the Province. The materials are very challenging and come from the US. B.C. is the only province currently running the program.

Wayne - When the WCP comes in will there be changes in the data analysis strand? Bruce - under the WCP it will continue to Grade 12. Garry - if topics do not appear on the Provincial Exam, they are usually not taught because of time constraints. With the WCP, data analysis will be on the Provincial Exam, so it will be covered. Bruce - it will appear on the Provincial Exam of January 2002. Tony - is the WCP only Principles of Math 12? Bruce - no, it includes both strands.

2.3 Ministry of Education - Bruce McAskill

The Task Force on Mathematics was charged with looking at 1) the "A" stream and recommending changes, 2) ways to improve the teaching of Mathematics K-12, 3) ways to encourage students to take math, and

4) numeracy. The recommendations are available on their web site. The deadline for comments is May 31, but he will accept them until June 4. The Task Force will be meeting on June 7 and 8 to look at any responses.

Leo - what was the thinking behind recommending the *Essentials* stream? Bruce - the principles stream prepares students for post-secondary mathematics. The applications stream serves students who don't need that kind of preparation. Concerns were raised by teachers and parents that even the applications stream would not serve some students. The Task Force looked at enrollment trends, TIMS results, etc. and agreed that something was needed for those students. This program will continue to Grade 12 with a Provincial Exam. There will be some changes made to the Math 10 - 12 curriculum to match the WCP. The intent is to do fewer topics with more depth. Wayne - is the intent still to have principals and applications as separate courses. Bruce - yes. The major drawbacks for the applied stream are a lack of learning resources and a lack of acceptance by post-secondary institutions. However, the enrollment is increasing. In B.C. about 35% of Grade 12 students take Principles of Math 12. Leo - recommendation 4.3 - what implications are there for this committee? Bruce - there was a concern about acceptance of courses. They wanted a process in place for acceptance of new courses. There is no information available about why one institution will accept a course when another one won't. Malgorzata - is disappointed that the Task Force did not include post-secondary Mathematics departments, especially as the recommendations effect the post-secondary institutions. Bruce - he agrees. You now have the opportunity to respond to the recommendations and your responses will be heard. Jack - there is a recommendations that "a" Math 12 course will be required for graduation. Bruce - if the *Essentials* course is approved a student could take one of three streams and there is a recommendation that one of these will be required for graduation. Malgorzata - there was a recommendation that 6 credit hours of Math Education courses be required for elementary teachers and that these courses be taught by Math Education professors. Bruce - the feeling was that the level of content was more appropriate to the Math Education department. The recommendations are draft and the Task Force welcomes responses. The intent of this recommendation (1.1.2) was not to say the Math Departments are not doing a good job teaching these courses.

The BCCUPM commends the Task Force for strong recommendations increasing mathematics and mathematics methods requirements for pre-service elementary school teachers. However, we find the wording of recommendation 1.1.2 unacceptable.

> **Motion:** that recommendation 1.1.2 be reworded as follows: That the College of Teachers require pre-service elementary education programs to include a minimum of 6 credit hours (2 courses) in mathematics content. These courses should cover mathematical concepts and processes <u>relevant to the elementary school curriculum. These courses should be designed and delivered by mathematics departments of post-secondary institutions in cooperation with mathematics education specialists</u>. [note - new wording underlined]
>
> Carried unanimously.

The Grade 10 - 12 IRPs will include the principles and applications WCP curriculum. They will also include a Calculus 12 course. He invites members from this group to be part of a committee to develop the curriculum for this course and needs names by June 24. Jack Bradshaw will be the contact, so if you are interested, talk to him.

2.4 ABE - Ruth Behnke

- It's a new day for college ABE across the province since courses became tuition free last summer. All colleges are reporting increased demand for ABE courses; classes are full to capacity; there are long wait-lists for some courses. This is the case for both class-based and self-paced programs.
- In spite of this positive atmosphere, I believe colleges are having a difficult time accommodating the increased demand. In some cases, there is now a need to establish a priority system for registering into ABE courses. Instructor workloads have increased with increased student/instructor class ratios.

- The Ministry has not provided additional funding for growth in ABE, so we can't offer more classes. With the recent restructuring of the Ministry, yet again, there are currently not a lot of people left in the Ministry who are very familiar with the ABE issues.
- Some colleges have also reported an increase in the number of students registering for courses and never showing up. However, at VCC we have not noticed a big difference. There seem to be a lot of mature, working people wanting to upgrade courses.

- Another note of optimism this past year has come from the work of the ABE Transition Project, co-chaired by Jean Cockell, former Associate Dean for ABE at VCC and Doug Moss, a school district representative. One of the main goals of the project was to develop a proposal for a Common Adult Credential. Both Ministries have already approved it and an official announcement is expected soon. This BC Adult Graduation Diploma will replace the current School District Adult Dogwood Certificate and the College ABE Provincial Diploma.
- The ABE Math Articulation Committee Meeting was held at Kwantlen University College, March 4-5, 1999. Lin Hamill, from the Math Dept. at Kwantlen, gave a presentation on what prerequisite skills are needed for upgrading students to succeed in 1st year Math courses. There was ongoing discussion regarding the definition and meaning of "equivalent" courses. ABE students will have the option of writing Provincial Exams for courses that are designated as equivalent to secondary school or Ministry-authorized courses.
- The Committee passed a motion to develop a data analysis module for the Advanced Level Math and a curriculum development proposal for this module was subsequently put forward to the ABE Steering Committee.
- College ABE programs recognize the need to keep informed and updated on changes in school district courses. ABE Articulation Committees have been requested to have a school district representative attending their articulation meetings in order to encourage increased cooperation between the two ABE systems.
- An issue that remains unresolved is the acceptance of ABE courses for admission to universities. BCCAT has been addressing this issue and there are some hopeful signs. The universities appear to be expecting the Ministry to develop some policy in this regard - to designate ABE courses as "equivalent to and interchangeable with" Gr. 11 and Gr. 12 courses. The Common Credential may also help to resolve this issue.

2.5 Centre for Curriculum, Transfer and Technology - John Meagher

One of the issues that has haunted us over the years is the discrepancy between what the post-secondary sector thought that a student should be able to do and what was proven to materialize. Could we talk about what we specifically thought a student should be able to do with a B in course “X”. Math was chosen as one of four areas to be pilot projects. They are now at the stage of sharing the information and recommendations and are asking for feedback. There are tremendous implications for these studies - curriculum design, information that goes to the secondary schools and parents, as a resource for career and personal planning programs, etc. In this province there has been very little attention paid to exit standards in the past. They are hoping for some kind of endorsement in principle of the findings.

[Mathematics Proficiencies Project Report - Leo Neufeld])

Leo summarized the work and results of his project, which included the following recommendations:

General Recommendations

1. **That the preparation of students for post-secondary mathematics/statistics courses include significant opportunity for the development of the general mathematical proficiencies cited in this report.** Students have developed many isolated competencies in mathematics, but often lack experience in selecting those appropriate to the solution of a problem or in synthesising them logically. As much as possible, opportunities should be provided for students to learn logical approaches, modelling strategies and problem solving techniques prior to entering post-secondary mathematics/statistics.
2. **That the instructional modes and the assessment of students preparing for post-secondary mathematics/statistics courses promote comfort with such skills as solving multi-step problems and as writing clear, well0organised solutions.** Confidence in the ability to tackle longer problems or to write well-constructed solutions is enhanced through the successful completion of such projects. By expecting high standards of performance on problem-solving and solution writing assignments, teachers greatly assist students in nurturing confidence and competence in this regard.
3. **That post-secondary mathematics/statistics departments be encouraged, independently and jointly, to communicate their mathematics/statistics proficiency expectations as a practicable guide for prospective students.** Funding for the development of a provincial information brochure, and corresponding web site, listing in one place the entry-level proficiencies identified for post-secondary mathematics courses, is strongly recommended.

4. **That the secondary and post-secondary mathematics instructors, through their respective provincial committees, work to ensure that the provincial final examinations for mathematics, and other assessment tools, evaluate the proficiencies/competencies seen as important for success in post-secondary courses.** Also, the Ministry of Education should be encouraged to pursue this objective of achieving a better match of exit standards with post-secondary entry requirements.
5. **That appropriate means be found to ensure that the findings in this Report are shared and discussed by secondary and post-secondary instructors of mathematics with the objective of promoting ongoing, constructive dialogue to address common issues.** Student transition from secondary to post-secondary can only become seamless if all factors relating to this transition are frequently reviewed and are openly discussed. The onus and the challenge to find satisfactory means for engaging in such constructive dialogue rests with all sectors of the education system.

Calculus Recommendations

6. **That students preparing for post-secondary calculus courses have a wide range of strong, mathematical proficiencies and that they have significant skill in choosing/combining various mathematical approaches or models to solve multi-stage problems.** Higher level thinking skills, model building and solving multi-step problems were expectations emphasised particularly by respondents to the *Calculus* questionnaire. Those students anticipating taking a post-secondary calculus course should be made aware of these expectations.
7. **That students preparing for post-secondary calculus courses possess high levels of mathematical proficiency in the function concept, specific functions and graphing techniques.** The manipulation of various functions in a calculus context requires strong conceptual and visualisation proficiencies. The development of these proficiencies by students is optimised through experience with many different functions and by seeing them in symbolic as well as graphical ways.

Introductory Statistics Recommendations

8. **That teachers preparing students for post-secondary introductory statistics courses be strongly encouraged to provide a learning environment that will enable students to develop a positive attitude towards mathematics and an appreciation for the utility of quantitative approaches to every day life situations.** *Introductory Statistics* courses are frequently taken in order to fulfill requirements for some statistical literacy in career programs. Particularly for these students, it is important to develop an appreciation for the vital role mathematics plays in the many aspects of our lives.
9. **That students preparing for post-secondary introductory statistics courses have developed some proficiency with descriptive statistics and with the elementary statistical functions of calculating or computing devices**. Some students entering post-secondary statistics courses have encountered data analysis topics previously, while others express very little (or no) familiarity with this subject. It is recommended that students be introduced to descriptive statistics and that, if possible, a related item be included on provincial final examinations. Also, students should be introduced to some calculation/ computing tools in the context of descriptive statistics.
10. **That students preparing for post-secondary introductory statistics courses possess mathematical proficiencies in the areas of set theory, combinatorics (permutations, combinations and distinguishing them) and solving word problems.** These proficiencies are very useful in *Introductory Statistics* and prior experience with them frees the student to concentrate on the applications in the course and to derive greater meaning from them.
11. **That post-secondary mathematics/statistics departments seek means to communicate with one another, with other departments offering introductory statistics courses and with secondary school teachers concerning their individual proficiency expectations of introductory statistics students.** The expectations of students in *Introductory Statistics* vary considerably among the post-secondary institutions. Although programs and departments enjoy full autonomy in the development and delivery of courses for their students, some awareness of practices elsewhere can be beneficial, particularly when course transfer credit becomes a factor. Thus, the establishment of a forum for communication about issues connected with this course is recommended.

Mathematics for Elementary Education Recommendations

12. **That students, teachers and parents have access to information that clearly describes the demands for first-year mathematics courses designed to meet Elementary Education requirements, or designed as**

terminal mathematics courses to meet other program requirements. A positive attitude towards mathematics and an appreciation of the fact that mathematics is a significant part of almost every aspect of daily life are critical factors for success in such courses.

13. **That students be made aware of the need to develop confidence and skill in a larger set of basic mathematical proficiencies than is presently the case in order to be successful in MFEE courses.** This set of skills should include proficiency in: solving linear equations/inequalities, graphing and writing the equation of a line, working with polynomial, rational and exponential expressions, and having a basic understanding of plane geometry. Respondents to the Survey commented on the overall weakness of some students in MFEE. They felt that if the students had even a small set of mathematical competencies, then they could easily succeed in the course.
14. **That students be encouraged to develop mathematical proficiencies in critical thinking and logic skills, and to maintain a positive attitude towards and a comfort with mathematics**. Conveying a positive, 'can do' attitude to young students is a critical aspect of teaching mathematics in the elementary school. For this reason, one of the major emphases of MFEEE is the nurturing of such an attitude in MFEE students. This becomes an exceedingly difficult task when working with students strongly biases against mathematics. If students planning to become elementary school teachers or those involved in counselling such students can be made aware of these expectation through the wide distribution of some of the results of this Report, then new registrant in MFEE might well exhibit some improved general mathematical proficiencies.
15. **That post-secondary departments involved in the delivery of MFEE courses commence a dialogue with appropriate stakeholders concerning their mathematical proficiency expectations of prospective MFEE students.** Students can receive credit for MFEE by successfully completing a variety of other, acceptable courses, having their own entry criteria. Although this situation is not in itself seen as unwelcome, a complete review and a re-validation of current proficiency expectations for MFEE by stakeholders would reassure those involved in these courses that their local practices are generally acceptable.

Fae - was there any attempt to quantify the level of proficiency? Leo - an assessment tool like a final exam doesn't provide any precision regarding specific topics - it is just a sample. Neil – it's easy to focus on what students **can't** do rather than on what they **can** do. Leo - the focus wasn't deficiencies, it was proficiencies. Where respondents thought sufficient emphasis wasn't being placed on a topic, they wrote those in as comments. Jack - the committee would like a motion of endorsement

Motion: That the BCCUPM

a) express its appreciation to the Steering Committee as a whole and to Leo Neufeld in particular for the work done in preparing the Mathematics Proficiencies Report,
2) endorse all the recommendations of the report and encourage their distribution to as wide an audience as possible, and
3) suggest that a summary as outlined in recommendation #3 of the report be prepared and posted on the BCCUPM web site.

Carried.

3. BUSINESS ARISING FROM THE MINUTES OF THE 76TH MEETING

3.1 PLA (Prior Learning Assessment

[PLA Project Report - David Lidstone]

David had 1/16 release last year to look at PLA specifically around challenging Calculus I. He ended up using three tools: 1) take-home assignment, 2) oral exam and 3) final exam. There was interest from about two dozen students, four of whom wrote, one of whom was successful and who subsequently withdrew from the next course. Langara will probably not repeat the experiment.

Susan O. - her understanding is that grades for challenged courses should be annotated for one more year. David - it is still vague, so people's information is variable. Clint - OUC's education council voted to retain annotations on transcripts after consultation with the ministry. Rick - was the information on the different components conflicting? David - in only one case the take-home exam was better than the other two parts. Susan O. - will the universities assign credit when a college has assigned credit under PLA? Malgorzata - nothing definite has been done. Guidelines suggest that institutions should accept it for transfer credit.

3.2 PIMS (Pacific Institute for the Mathematical Sciences)

a) Report of *Changing the Culture II* - Malgorzata Dubiel

One of the main events is the *Changing the Culture* Conference. The goal is to bring together mathematicians, math educators and teachers. The first conference a year ago was very popular with about 100 participants including many elementary and high school teachers. This year there was a charge of $30 and there was less interest from school teachers. There were three panel discussions and the report is available on the PIMS web site.

b) Future Events - PIMS

Malgorzata invited the group to attend next year's conference - there is now money in the institute for projects towards education or changing mathematics culture. If we are interested, for smaller projects, we should apply to one of UBC, UVic, SFU, U of C, or U of A. For larger projects, we should apply directly to PIMS. Other activities include undergraduate conferences, etc.

4. INSTITUTIONAL/ARTICULATION BUSINESS

4.1 Reports from Institutions (all reports must be submitted in hard copy or by e-mail to be included)

- CAMOSUN -

We enjoyed strong enrollments again this year. In fact, we had long waitlists for college prep and first year courses. Unfortunately, due to changes in how the budget is handled within our college, we have lost our ability to mount extra sections as the need arises. We are working on this problem with our administration but ...

A new venture this past year was a partnership program with Spectrum Community School in which we brought their Calculus 12 students to the college every second week for Maple labs. The students really enjoyed this activity and about half of them have applied to come to the college this next year.

Our biggest disappointment is that despite raising prerequisites in both first year calculus (we now require a recent B in Math 12) and Precalculus (a recent C+ in Math 11), we have not seen a significant increase in the retention or success rates. We aren't really sure what the solution or indeed the problem is. If any of you have strategies for improving retention rates in college prep and first year we'd be interested in hearing about them.

We do have one articulation matter to bring forward with regards to our second year Maple course, Math 235B. We distributed very sketchy information three years ago hoping for unassigned math credit. Many of you commented that you felt it was not an academic course and gave it no credit. We are going to try again! We will be sending the universities and university colleges a new improved course description, outline and final exam for this course. We hope that you will be able to agree with us that this Maple Course is indeed a meaty course deserving of unassigned math credit.

Lastly, we look forward to hosing you next year at Camosun College in Victoria. The great news for us is that Leo has volunteered to do most of the work!

- CAPILANO - Rick Brewster
  - Greetings from Ted Bentley, Chris Morgan and the rest of the Math Department.
  - Bob Rennie retired as of August 1, 1998 and Alf Waterman is retiring as of August 1, 1999.
  - We are offering numerous summer courses again this year and have hired 4 new part-time temporary instructors (a real youth movement!)
  - We will offer Math 190 (Math for Elementary School Teachers) in Sechelt as a result of special First Nations Funding, and will possibly institute the course as part of our regular offerings staring next spring.
  - There has been significant growth in Discrete Math offerings.
  - The second year Stats course is using Excel.

- DOUGLAS
  - The new budget has brought good news to our department this year. Our base has been increased by 6 sections which will be used to augment our Summer School and David Lam (Coquitlam) Campus offerings. This should help ease the continued demand on our first year courses.
  - We were able to find funding to provide a Math Tutor at our David Lam Campus this winter and are hoping to be able to keep her there full-time next year.
  - Demand for our discrete mathematics courses is strong and we plan to offer an additional section of Math 130 over the next year.
  - Curriculum revisions to our first-year Calculus courses are complete and we plan to begin offering Calculus in an early transcendentals format beginning in the Fall. We made this switch in order to facilitate transfer for students between institutions and are very concerned to hear that SFU is discussing changing their curriculum to start teaching integration in the first semester effective this September. We plan to write a letter to SFU expressing our concern about this precipitous decision and ask all other affected institutions to do the same.
  - We have been having some difficulties involving access to computing equipment and funding for course specific software and will be sending out a brief questionnaire by e-mail next week to survey how other institutions are dealing with these issues. We would appreciate any information you could send our way.

- FRASER VALLEY

  New programs: We have received approval "in principle" for a B.Sc. in Mathematics and a B.A. in Mathematics. These degrees extend our current minor/extended minor offerings in Arts and Science. Final ministerial approval should be received soon. Our Bachelor of Mathematics proposed degree is currently languishing on institutional proposed-program lists.

  New courses:
  Math 235 Mathematical Modeling: an introduction to modeling techniques, in a Maple environment. Prerequisites are first-year calculus and corequisites may be chosen from statistics or linear algebra courses.
  Math 255 (Cross-listed with Engineering 255) Ordinary Differential Equations: replaces our Math 310. A major audience will be engineering students. Designed to transfer to UBC's 255.
  Math 115/116 replaces our Math 113/114. Designed to reflect a new emphasis on modeling and the use of software, and to make the courses appropriate for students of biology as well as business and computing. Classes will be taught in a Maple lab.

  First year Calculus: We are switching to the 4th edition of Stewart, but our courses will still be very much informed by the reform approach, and Hughes-Hallet will continue to be an important resource. We will continue to use graphing calculators.

  Enrolment: Enrolment was high this past year, with most calculus sections oversubscribed. We have added a new fall Science calculus section for '99-'00. Past experience suggests that our first and second year enrolments will increase significantly when our major degrees are finally in place.

Math Centre: We now have a half-time staff member. The lab is open about 35 hours per week and is very popular!

- KWANTLEN
  1) Kwantlen has a new president, Skip Triplett.
  2) The Surrey Campus has a new building (which includes a gym).
  3) There will be a Learning Skills Centre opening in the new building servicing the needs of Math, English and Counselling - the Math position may be either a 1/3 or 1/2 time faculty position.
  4) We are now required to teach Maple in our Calculus courses.
  5) The ban on graphing calculators has been lifted.
  6) Last year we switched to a reform approach in calculus and adopted *Ostebe-Zorn* (previously we used *Stewart - Early Transcendentals*). This has caused major disagreements in our department. We will now be alternating between these two textbooks on a year-by-year basis!
  7) Earl Naismith is retiring and will study Chinese at SFU.
  8) Geography is teaching a statistics course as part of a new degree. The Math Department protested but in the end was not supported by Education Council.

- LANGARA - Statistics - Veda Abu-Bakare
  1) The Stats program has been running very well with healthy enrolments in most of our courses. However, we have been experiencing difficulty with enrolments in our lab-based intro. stats courses S1127/S1128. Pedagogically, this was an excellent initiative, but the increased number of contact hours (4 hours lecture + 2 hours lab) and the lack of recognition for transfer credit for the lab portion have translated into low enrollments and the non-offering of these courses. We do remain committed to this method of delivery and we are seeking ways to integrate labs and activities in our teaching.
  2) We have been using the software package SGP (StatGraphics Plus) for about 3 years now and we have become very familiar with it. However we are experiencing a number of frustrations with the package and we are monitoring the usefulness of the package for our needs and that of our students.
  3) Our text for our Business Stats S181/225 combination has gone out of print and we have adopted that Anderson, Sweeney and Williams *Statistics for Business and Economics, 7^{th} edition*.
  4) Our work into developing the Applied Information Management (AIM) program has shown that there is not a market at this time for this program. We hope to revisit this in the future.

- MALASPINA
  - There have been two administration changes: Vice President for instruction and Dean of Science and Technology.
  - Jean Neilson continues as Math Department Coordinator
  - Larry Kitt returns in the fall semester from a one-year leave of absence.
  - Some Math faculty will be experimenting with large class sizes. These will be coupled with small sized problem sessions.

- NORTH ISLAND
  - Enrollments in NIC math courses increased this year (1998/99) with long waiting lists in first year calculus and math 12 courses. Second year enrollments are still low, but increase by 66.7% from last year in Calculus III (from 3 to 5).
  - The completion rate was higher than in previous years, as we are getting more good students (some of them excellent) from local high schools.
  - In Calculus, we have switched to an early transcendentals approach, and we have continued with our Calculus Lab using Maple V.
  - Calculus for Life Sciences and Finite Math were added to courses taught at NIC in Campbell River.

- NORTHWEST
  At the Terrace campus, two pre-calculus courses (MATH 111 and MATH 112) are being added to our complement of Mathematics offerings to buttress the mathematical preparation of students enrolled in Chemistry and Physics. The year just past has seen efforts to integrate science courses more closely. Additionally, next year's science labs will feature a more extensive treatment of data analysis.

- OPEN UNIVERSITY - Veda Abu-Bakare
  1) Revision and maintenance of our courses remain a priority. We are constantly competing for resources within the Agency to keep updating our courses and to keep current with new editions of texts.
  2) We are revising our Intro Stats course to include more data analysis and activities.
  3) Migration of OU courses to the Web continues with increasing enrollments. In the Math/Stats area, only 1 of our print courses (M102, Intro Stats) is offered in the on-line mode.
  4) Our web site is www.ola.bc.ca.

- TECH B.C. – Tim Collings
  Preamble: TechBC is Canada's newest University and will be offering undergraduate and graduate degree programs commencing September, 1999 in 3 program areas: i) Information Technology, ii) Management and Technology, and iii) Interactive Arts. All 3 program areas feature a common first year divided into two 18-credit terms. Each term consists of five 3-credit courses where each course is broken down into three 5-week modules each worth 1 credit. In addition to the 5 courses, there are three 1-credit modules in each semester covering: i) Team Dynamics, ii) Learning and Information, and iii) Communications. For more detailed information on course modules, please refer to our web site at www.tu.bc.ca.

  BCCUPM: Of particular relevance to this committee is the fact that we are offering 3 "Math" courses in the first year (Tech One): i) Probability and Statistics (Tech 101), ii) Linear Systems (Tech 106) and iii) Dynamic Systems (Tech 107). Tech 101 consists of 3 modules: 1) Probability, 2) Descriptive Statistics and Estimation, and 3) Inferential Statistics.

  The Linear Systems/Dynamic Systems sequence covers 6 modules in total: 1) Linear Algebra, 2) Functions, 3) Derivatives, 4) Integrals, 5) Differential Equations, and 6) Transforms and Series.

  More and more work in IT, Management and Arts relies on the ability of learners to analyze and model situations and systems. Our program advisory committees have articulated to us that problem solving, reasoning, justifying ideas, making sense of complex situations, and learning new ideas independently are today's critical skills. Therefore these courses will introduce students to mathematical principles important in analysis and modeling and, wherever possible, mathematical relevance will be contextualized using a variety of everyday activities, systems, inventions and discoveries.

  In addition, there will be two Applied Math courses in the 2nd year of the IT program covering advance mathematics topics in Linear Algebra, Calculus, Discrete Math, Complex Variables and Stochastic Processes. These courses will feature a more rigorous mathematical approach but will also be illuminated by connections to Engineering, Computer Science and Physics.

  Every course at TechBC uses an integrated learning model, which combines on-line and face-to-face methods of delivery. For more detailed information on delivery models, please refer to our web site: www.tu.bc.ca.

- UBC – Charles Lamb
  The 1998/99 academic year has seen significant changes in the Mathematics Department at UBC. The most important change is the reorganization of the first year calculus offerings. We now have the following calculus sequences.

  Math 100/101: Calculus with Application to Physical Sciences and Engineering.
  Math 102/103: Calculus with Applications to Life Sciences.
  Math 104/105: Calculus with Applications to Commerce and Social Sciences.
  Math 120/121: Honours Calculus

Each of non-honours sequences will meet for 3 hours per week and the Life Sciences stream will have a bi-weekly computer lab. The honours stream has not been changed and will continue to meet for 4 lectures per week. These streams have been set up so as to include a common amount of core material, and any stream can be used as a prerequisite for further high level mathematics courses. Students will be allowed to switch streams after the first course, subject to availability of space.

Math 215 (Elementary Differential Equations) has been reorganized so that it no longer requires Math 221 as a prerequisite or corequisite. A new course Math 217 (Multivariate and Vector Calculus) has been created which combines material from Math 200 and 317. Math 130 (Finite Mathematics) which is a 6 credit course has been split up and renumbered as two 3 credit courses Math 230 and 231.

- UVIC – Chris Bose
  - There have been no major curriculum changes in the past 12 months.
  - There was one retirement: Dr. D.J. Miller (Discrete Math)
  - There were two tenure track people hired: Dr. Julie Zhou (Stats) and Dr. Jing Huang (Discrete Math)
  - They have been involved with PIMS Alternative Math education Nights. There have been 3 in the last 12 months. These Primary/Secondary School events are strongly supported by the faculty.

4.2 List Updates: Mailing, Telephone, Fax and E-mail

Lists were circulated for revisions.

4.3 BCCUPM On-line (http://www.camosun.bc.ca/~bccupm/)

The web-site will update the agenda prior to next year's meeting, so members should check it a day or two before coming.

5. NEW BUSINESS

5.1 Theme for the 78th Meeting of the BCCUPM

There was a suggestion that the theme for next year's meeting would be Finite Math, Discrete Math and Math for Elementary Education courses. Because Discrete Math is of interest to computer science, a suggestion was made that we time our meeting to coincide with the computer science meeting.

5.2 Terms of Reference

Before proceeding with a name change, it was suggested that Leo place some preliminary information regarding the BCCUPM's Terms of Reference on the web. We could then comment on and perhaps even refine these statements before our next Meeting.

5.3 Transfer Innovations

Some questions were raised about the amount of money available and whether it was adequate to do anything substantive. David M - suggested that we endorse Richard's suggestion of having "model courses" and institutions would get transfer credit if there were an 80% (for example) match. Alan - has some concerns about putting much energy into this unless the universities agree to buy in. Chris and Malgorzata said that they were not in a position to agree or not right now, but offered that having a generic outline was a good idea. If we put something like this together it could then be given to the people in their institutions who would make the decisions. This discussion (and possible formation of a committee) will be concluded tomorrow.

5.4 Web Resources – Alan Cooper

Alan presented some ideas he had about collecting math resources available on the web.

> **Motion:** That a subcommittee of the BCCUPM be formed (with Alan Cooper designated as an initial coordinator for collection of names of those interested) with a mandate to investigate the available tools for maintaining a database of web-based "learning objects" in mathematics, and (with due cognizance of any other activities in the same direction), to seek partners and funding for the implementation of such a resource.

The intent is to have anyone who wants to contribute to be part of the subcommittee.

Carried unanimously.

If you are interested in being involved, contact Alan Cooper, <acooper@langara.bc.ca>.

5.5 Calculus 12 Curriculum Committee

BCCUPM appointments to the Curriculum Branch's committee on designing a calculus course for the secondary schools will be recommended by the chair. John Peregrym and Slava Simice have volunteered to serve on the committee.

5.5 Curriculum Changes Concern

> **Motion:** that we request that SFU refrain from making any curriculum changes to the science stream calculus that would adversely effect any transfer arrangements without giving at least one year's notice.

There is usually a grace period when curriculum changes have been made. Susan - there may be a grace period for transfer credit, but she is concerned that students transferring after one term will be at a disadvantage in the next course. Malgorzata - members who are concerned should pass those concerns on to the professors who are proposing these changes (A. Lachlan - chair, USGC alistair@cs.sfa.ca and Rustum Choksi choksi@cs.sfu.ca).

Carried, 1 abstention

6. Date and Location of the 78th meeting

The 78th meeting of the BCCUPM will be held at Camosun College in Victoria. The tentative dates are May 25-27, 2000.

7. Adjournment

The Friday Session of the 77th meeting of the BCCUPM adjourned at 5:30 p.m.

[Saturday, May 29th, Session: Maple V Presentations: Financial Derivatives – Ed Butz, Maple in Pre-Calculus – Wayne Matthews, Differential Equations – Jeff Orchard.]

Many, many thanks to Clint Lee and Okanagan College for all their work in hosting us for the 77th Meeting.

List of Committee Members Present (Thursday Session)

Veda Abu-Bakare	Open University/Langara
Peter Anderson	Northwest
Jim Bailey	College of the Rockies
Chris Bose	UVic
Rick Brewster	Capilano
Eric Buckley	OUC (BCCAT Liaison Administrator)
Bill Calver	Camosun
Kim Chew	Columbia College
Neil Coburn	Selkirk
Tim Collings	Technical University
Alan Cooper	Langara
Fae DeBeck	Cariboo
Sylvie Desjardins	Okanagan
Malgorzata Dubiel	SFU
Erich Durberger	Coquitlam
Richard Hallett	Selkirk
Dan Henschell	Douglas
Sonja Hot	Cariboo
Howard Hunt	Malaspina
Charles Lamb	UBC
Clint Lee	Okanakan
Dave Lidstone	Langara
Jean MacLeod	VCC - King Edward
Judy Malcolm	New Caledonia
Wayne Matthews	Camosun
Casey McConill	Kwantlen
Susan Milner	Fraser Valley
Leo Neufeld	BCCUPM Chair
Susan Oesterle	Douglas
John Peregrym	Selkirk
Lesley Robinson	Cariboo
Greg Schlitt	Fraser Valley
Slava Simice	North Island
Wesley Snider	Douglas
Dave Tomkins	Cariboo
Ken Towson	Capilano
Tony Webb	BCIT
Larry Weldon	SFU
Jim Vance	UVic

Secondary School Teacher-Visitors (Late Thursday Afternoon Session)

August Beetlestone	IRHS
Bev Bosman	Princess Margaret (Penticton)
Delee Cowan	Kelowna Secondary
Bruce Gow	Penticton Secondary
Jack Hoy	Kelowna Secondary
Vic Keehn	Summerland Secondary
Dave Killick	Princess Margaret (Penticton)
Duncan Millar	Penticton Secondary
Keith Reid	RMS (Kelowna)
Glynis Shaw	Kelowna Secondary

List of Committee Members Present (Friday Session)

Veda Abu-Bakare	Open University/Langara
Peter Anderson	Northwest
Jim Bailey	College of the Rockies
Ruth Behnke	VCC - King Edward/ABE
Chris Bose	UVic
Jack Bradshaw	Cariboo
Rick Brewster	Capilano
Eric Buckley	OUC (BCCAT Liaison Administrator)
Bill Calver	Camosun
Mohamed Chabi	Northern Lights
Kim Chew	Columbia College
Neil Coburn	Selkirk
Tim Collings	Technical University
Alan Cooper	Langara
Fae DeBeck	Cariboo
Sylvie Desjardins	Okanagan
Malgorzata Dubiel	SFU
Erich Durberger	Coquitlam
Robb Fry	UNBC
Richard Hallett	Selkirk
Dan Henschell	Douglas
Sonja Hot	Cariboo
Howard Hunt	Malaspina
Charles Lamb	UBC
Clint Lee	Okanakan
Dave Lidstone	Langara
Jean MacLeod	VCC - King Edward
Judy Malcolm	New Caledonia
Wayne Matthews	Camosun
Bruce McAskill	Ministry of Education
Casey McConill	Kwantlen
John Meagher	C2T2
Susan Milner	Fraser Valley
Leo Neufeld	BCCUPM Chair
Susan Oesterle	Douglas
John Peregrym	Selkirk
Garry Phillips	BCAMT (New West. Secondary)
Lesley Robinson	Cariboo
Greg Schlitt	Fraser Valley
Slava Simice	North Island
Wesley Snider	Douglas
Dave Tomkins	Cariboo
Ken Towson	Capilano
Tony Webb	BCIT
Larry Weldon	SFU
Jim Vance	UVic