

**Physics & Astronomy Articulation Committee Meeting
6 May 2016**

CNC, Prince George, BC

Location: Boardroom (room 3-311); in 300 Block building of the Main Campus Building Complex.

Present:

Institution	Representative(s)	Email
Alexander College	Kelly Cheung	kellycheung5@gmail.com
BCIT		
Camosun College	Chris Avis	AvisC@camosun.bc.ca
Capilano Uni	Bruno Tomberli, Bernd Simson, Lauren Moffatt	brunotomberli@capilanou.ca
CNC	Barbara Rudecki, Eva Gregory	rudecki@cnc.bc.ca
College of the Rockies	Trevor Beugeling	TBeugeling@cotr.bc.ca
Columbia College	Tara Todoruk	ttodoruk@columbiacollege.ca
Coquitlam College		
Douglas College	Jennifer Kirkey	kirkeyj@douglascollege.ca
Kwantlen PU	Jana Kolac, Michael Poon	Jana.Kolac@kpu.ca
Langara College	Terrence Coates and Todd Stuckless	tcoates@langara.bc.ca
North Island College	Dennis Lightfoot	dlightfoot@nic.bc.ca
Northern Lights College		
Northwest Community College	Regan Sibbald	rsibbald@nwcc.bc.ca
Okanagan College	Dr. Ryan Ransom	RRansom@okanagan.bc.ca
Selkirk College	Jason Nickel	jnickel@selkirk.ca
SFU	Jeff McGuirk	jmcguirk@sfu.ca
Thompson Rivers	Joanne Rosvick	Jrosvick@tru.ca
Trinity Western U	Arnold Sikkema	Arnold.sikkema@twu.ca
UBC Okanagan	Murray Neumann	Murray.neuman@ubc.ca
UBC Vancouver	Thomas Mattison	mattison@physics.ubc.ca
UFV	Peter Mulhern	Peter.Mulhern@ufv.ca
UNBC	George Jones	George.Jones@unbc.ca
UVic	Mark Laidlaw	laidlaw@uvic.ca
Vancouver Island Uni	Brian Dick	Brian.dick@viu.ca
VCC	Andy Sellwood	asellwood@vcc.ca

Minutes

The meeting was called to order at 9:30 am by Andy Sellwood, Chair.

Welcome from College of New Caledonia, by Chad Thompson, Interim Dean, School of Health Sciences, and Barbara Old, Acting Vice President of Community & Student Services.

Acknowledgement of our Traditional Territory, Lheidli T'enneh.

Chad Thompson presented the following considerations to the articulation committee:

- What can we do to get more students understanding the importance of physics before entering college and university?
- The introductory physics text book costs more than the course. Can a new text book be developed, and if so, what is needed?

1. Introductions

2. Approval of Agenda

The agenda was reviewed and accepted.

3. Approval of May 2015 minutes

Moved, Seconded, and Carried.

4. Matters arising from minutes Corrections/changes to Textbook Lists/Articulation Charts which are online at the BCCAT Articulation Committee website: <http://www.bccat.ca/articulation/committees/>

Please contact Andy Sellwood if changes are required.

There was an update provided by, Angie Calleberg, Ministry of Education, regarding curriculum drafts (correspondence provided), and articulation committee feedback was requested.

Detailed feedback regarding the physics 11/12 curriculum was provided to the Ministry but there has not yet been a response, nor draft provided.

The draft physics 11/12 core required modules and choice modules were reviewed and discussion followed.

The articulation committee strongly suggests that the E & M and Waves and Optics be core required modules. Andy Sellwood suggested that a draft be posted on the google group page for comments and discussion.

There was a question presented to the Articulation Committee regarding thermal physics:

How are sending schools delivering thermal physics to students in engineering programs?

Discussion followed regarding thermal physics offerings and the development of a standard curriculum with a third physics course. The combination of the overall physics learning objectives was suggested rather than creating a third course.

5. BCCAT issues and information - Pending Requests in the Transfer Credit Evaluation System (TCES)

A comment was provided regarding course outlines being inadequate, as a reference tool for transfer, due to the limited information provided. It was noted that many institutions follow course outline template forms, which may not include reference to textbook materials, or information to judge equivalencies.

6. BCCAT Report Spring 2016 Update

There was a report provided by John Fitzgibbon at the UNBC Engineering Articulation meeting and discussion highlights included:

Portfolio Assessments – The possible change from grades to portfolios for K-12 curriculum.

Council Awards – BCCAT is calling for nominations in transfer & articulation.

7. Google group <https://groups.google.com/forum/#!forum/physastro-articulation>

The google group continues to be the primary means of communication.

8. Confirmation of date and place of 2017 meeting

The 2017 Physics & Astronomy Articulation Committee meeting will be held on Friday, May 5, 2017, at the University of Victoria, in partnership with Camosun College; details to follow.

Douglas College is happy to host the 2018 articulation meeting.

Discussion and motion followed regarding the Physics and Astronomy Articulation Committee Chair and Vice Chair positions being fixed terms, of four years (chair), and two years (vice chair).

- Moved, Seconded, and Carried.

9. Roundtable reports/brief discussions of significant curriculum changes and associated issues

See attached departmental reports appended to the minutes. Further notes from the discussions are summarized below.

Alexander College

- Currently in the process of developing a first year engineering transfer, switching from two courses, to three courses, as required by UBC. The hope is to accommodate students, as there are 70% who transfer to UBC, compared to SFU or other institutions.
- Astronomy was offered for the first time but with low observation, due to weather.

BCIT

- James Brewer, BCIT representative, sent his regrets and his report will be appended to the minutes.

Camosun

- Calculus based physics courses are now aligning better with UVIC to accommodate 95% student transfer.
- September 2016, there will be an implementation of the quarter-to-semester transition for engineering programs. This has resulted in a loss of first year physics (seven sections), faculty positions, and possible opportunities for student bridging.

Capilano

- New second year course offering, Material Science for Engineers, and positive momentum in the development of second year courses.
- Currently in the process of repackaging for approval the Associate of Physics Degree to the Associate of Applied Science Degree.

CNC

- Successful delivery of algebra based physics courses offered via video conference.

- Additional offerings of calculus based physics, off semester, to accommodate an increase in enrollment.

College of the Rockies

- Enrollment good with 22 to 25 students in the first semester.
- Loss of students in the second semester due to math skills.
- Astronomy is doing well and quite popular.

Columbia College

- Offered a second year thermal physics course/directed study.
- Submitted a second year electro magnetics course for articulation.
- Steady enrollment for spring and fall with a decrease in summer enrollment in science, due to the change in placement testing.
- Preparing a basic physics course for non-science students for articulation with the intent to satisfy associate degree requirements for students.

Coquitlam College

- Coquitlam College sends their regrets.

Douglas

- Hiring new contracts next year for physics/engineering.
- New engineering program soft launch.
- High numbers and great hopes for expansion.
- Soon to be offering a second year course in classical mechanics.
- Astronomy doing well.

Kwantlen Polytechnic University

- Physics in modern technology doing well with ten graduating from the second year.
- 27 first year students are intending to take modern technology.
- Now receiving first year transfer students from all sending institutions.
- Losing engineering students, due to high prerequisites, and the full-time program declaration requirement.
- Astronomy is doing well.

Langara College

- Rise in international students with seven sections added in the last year.
- Science and nursing programs are moving to the new building in August.
- Langara has signed a transfer agreement with Queens University.
- Discussion regarding ILTS English barriers for international students.

NIC

- Same offerings all via ITV or teleconference to three campuses with 1/3 classes face-to-face instruction.
- In the fifth year of collaborative instruction with College of the Rockies.

- No astronomy but regularizing a sessional nuclear astrophysicist instructor.

Northern Lights

- No response; due to lack of articulation funding?

Northwest Community College

- Demographics decreasing year-after-year.
- Algebra based physics and pre-calculus going to open text and seeking collaborative development.
- I pads to be provided in place of textbooks and looking at using Vernia node sensor for labview.
- Direct videoconference line to UNBC and will be looking at additional offerings online.
- Vidyo program excellent for internet communication.

Okanagan College

- No change in course offerings.
- First year astronomy offered at three campuses with an increase of arts and science students.
- Currently looking for a full-time replacement for a retiring faculty member.
- Hosting the American Physical Society (Northwest section) Conference.
- Happy to host the 2019 Physics and Astronomy Articulation Meeting (Kelowna or Penticton).

Selkirk

- No major changes to physics courses this year.
- Astronomy has not been offered for several years.
- Physics enrollment has increased significantly, 150%.

SFU

- Adopting the OpenStax for physics 100 (physics 12) equivalency.
- Enrollment steady for introductory courses but an increase of 20-40% for 200 and 300 levels.
- Administration has made a decision to change the funding allocation model which has affected the stem budget with a reduction to a zero sessional model.
- Lab philosophy has changed focus to experimentation and measurement.
- New undergraduate seminar course.
- Relaxed honours degree requirements from 132 to 120 without sacrificing content.

UFV

- Enrollments are marginally down.
- A record number of physics graduates, 20 this year.
- New mechatronics course requiring two new hires.
- 5 year review upcoming.

Thompson Rivers University

- Enrollment steady with the exception of decline in the number of first year calculus students.
- Open learning stars and galaxies course is now online and solar systems course in development.
- Very interested in OpenStax and consulting with regard to development.

Trinity Western University

- Differential equations course scheduled for fall.
- Offered two directed studies courses for keen triple major student.
- Failure rates are very high due to increase in international students.

UBC Okanagan

- No changes in enrollment or curriculum for the first year level.
- Curricular innovation is at the frontier of engineering.
- Entrance requirements for algebra based courses may change in order to drop restrictions.
- Introduction of medical physics courses.
- Enrollment and graduate numbers are positive.

UBC -Vancouver

- The coordinated Science Program changed from preparation for all science to preparation for life science (no requirement for physics 102) resulting in a loss of 100 students.
- Standard graduation numbers for sciences.
- Not as many articulation change requests as expected. The Physics 117 course satisfies physics degree requirements, and may be a more useful transfer, rather than Physics 101.

UNBC

- Currently reviewing of all ongoing programs.
- Continuing to offer the full physics degree.
- Substantial increase of first year calculus based physics enrollments.
- Astronomy enrollments have increased by 200 percent in the last two years.
- Ongoing discussion regarding how much thermal physics to put into first year calculus based programs without the sacrifice of E & M.

UVIC

- No curriculum changes.
- Engineering enrollment numbers stabilized.
- Planning for Sept 2017 to split the two term algebra based courses to single term courses.
- Second year thermal dynamics will be changing back to a third year course and numbered as PHYS 317, with moderate content change.

- New second year course, computational mathematics and physics, which will be offered in the spring, and required in math as a prerequisite.
- The second year laboratory electronics course is being renamed/numbered to introduction to laboratory methods.

VIU

- Enrollment numbers are consistent.
- Lifestyle science and physics streams are still being offered.
- Astronomy steady.
- Phys 216 was relaunched with transfer to UVIC last year. The course needs improvement to better reflect student learning.
- The annual Extreme Science Show is a very successful fundraiser for solar lighting systems.

VCC

- The engineering transfer program has started which has increased enrollment numbers for first year physics; two sections of physics 2 in January.
- New first year Mechanics course which transfers to UBC and possibly UVIC.

10. BCcampus and Open Textbook Project – Jennifer Kirkey

Jennifer Kirkey provided an informative presentation and handout regarding the BCcampus and Open Textbook project.

11. What are the desired skills for high school students entering 1st year physics? – Andy Sellwood

Andy Sellwood will be presenting at the BC Association of Teachers' Meeting and he will be providing feedback regarding the desired skills for high school students entering first year physics. There was a survey circulated to SFU physics students which resulted in 75 responses. Andy invited articulation committee members to take the survey, so feedback and comments, can also be provided on behalf of the articulation committee.

The following key points were provided:

- Math and trigonometry.
- Don't disengage students.
- Have students solve higher learning problems e.g., George Polya, How To Solve It.
- Conceptual learning.

12. Afternoon Discussion

Grade Appeal Policy-What is your school's Grade Appeal Policy?

Discussion followed regarding grade appeal procedures, timelines, and fees.

Adjournment

Moved, Seconded, and Carried, at 15:30.

Institutional Reports

Alexander College Physics Articulation Report: May 2016

Alexander College is a small private college that focuses primarily on foreign students who cannot get into the regular Provincial universities due to a lack of language and cultural skills. We have two campuses, one in Burnaby near Metrotown and the other in Downtown Vancouver opposite SFU Harbour Centre. We typically offer about 100 different courses with a combined enrollment of 1,300+ students.

Our general aim is to offer students a palette of first- and second-year courses along with intensive language training and small classes, where a large amount of personal attention is possible. The courses are designed to be at the academic standards of the corresponding introductory courses at SFU, UBC and UVic and, thus, to provide transferable credits to students who wish to gain entry to those institutions. We presently offer two-year "Associate" programs in Arts, Science, and Business, all of which include laboratory science requirements. We are in the process of developing a program of First-Year Engineering Transfer.

All Physics courses are offered at the Downtown campus limited to a class size of 20 students. Smaller classes allow students to more easily examine concepts in groups and share their results with the class. In addition, students are given the opportunity to work with concepts as they are being presented through active learning techniques and laboratory exercises.

Physics courses presently approved are:

Physics 100: Introduction to Physics

A one-semester preparatory course for students lacking physics background at the BC 12 level.

(Text: Knight, Jones, and Field, *College Physics*)

Note: Runs every semester; the past year ~40% of the students who registered in the course received A or B grades.

Physics 101-102: Physics for the Life Sciences I and II

Two sequential one-semester algebra-based introductory physics courses for students concentrating in Biology and Chemistry.

(Text: Giancoli, *Physics: Principles with Applications*)

Note: Has not been offered since 2011.

Physics 141-142: Engineering Physics I and II

I: Mechanics and Modern Physics

II: Electricity and Magnetism, Optics

Two sequential one-semester calculus-based introductory physics courses designed for science and engineering students.

(Text: Cummings, Laws, Reddish, and Cooney, *Understanding Physics*)

Note: 141 and/or 142 ran every semester; ~50% of the students who registered in the course received A or B grades.

Physics 151-152-153: Our 3-course Engineering sequence

151: Mechanics for Engineers

(Text: Hibbeler, *Engineering Mechanics: Static and Dynamics*)

152: Oscillations and Waves, Fluids, Heat, and Thermodynamics

153: Electricity and Magnetism, Circuits, and Radiation

(Text: Knight, *Physics for Scientists and Engineers*)

Note: These courses will be offered for the first time in the upcoming Spring 2016 term (in place of the 141-142 sequence).

Physics 191: Introduction to Astronomy

(Text: Backman, *ASTRO*)

Note: Ran for the first time in Winter 2016; ~45% of students received an A or B grades.

BCIT Physics Department Report, 2016

The BCIT Physics Department has 11 full time faculty members, 3 technicians, and teaches around 1000 students in 17 different technologies.

We are now offering a “Modern Physics” course as an elective to Bachelor Degree students in Mechanical Engineering, this is in addition to the Astronomy course already offered. Otherwise, no other significant developments have occurred in the department since the last articulation meeting.

James Brewer

Camosun College Department of Physics and Astronomy
Articulation Report - May 2016

In the Arts & Science Studies program, we offer college prep (access) PHYS 101 as well as first year courses: PHYS 104/105 (algebra based) and PHYS 114/115 (calculus-based) and enrollment in these courses has remained steady in 2015/2016. Beginning in Fall 2016, 114 and 115 will be replaced with 140 and 141, courses that cover comparable material at the same level of rigour, but with content rearranged to allow for 1-to-1 transferability with UVic's 110 and 111 courses. The major changes involving transferring electricity and magnetism into 140 and adding physical optics and relativity to 141. Accompanying this change, we have switched textbooks from Serway's *Physics for Scientists and Engineers* to Young and Freedman's *University Physics*. We have also made minor changes to our PHYS 101 course to include topics on waves and optics.

Astronomy courses (ASTR 101/102) continue to attract students in large numbers and we have continued to maintain increased offerings with 3 sections per semester. The second year courses (PHYS 200, 210, 214 and 215) remain closed since 2010. We continue to teach Physics labs for one local High School, whose students are enrolled in their Grade 12 Physics AP courses (AP "C" course) The Medical Radiology Technology program is now in its fifth year. Last September, it launched a completely revised program and MRAD 113 and MRAD245, the two courses serviced by our department were cancelled and replaced by a new single term course, MRAD 165 that is launching this Spring.

The most significant impact to our department has been the implementation of a "Quarter-to-Semester" (Q2S) transition in the Engineering Programs (Access, Technology and Bridge) under the School of Technology and Trades at our Interurban campus which come into effect this fall. The Engineering Access-specific courses, PHYS 150 and 151 have been cancelled and replaced with an equal number of offerings of PHYS 101 and 104.

The Civil and Mechanical Engineering Technology programs have eliminated our first-year PHYS 191 and 192 courses (a loss of 7 sections in total) and PHYS 154, a course that services the Electrical Technology program has been cancelled and replaced with PHYS 157, a similar course with additional topics in electricity and magnetism. We are also developing a new course focussing on the Physics of Renewable Energy (PHYS 272) that will be offered as part of the Mechanical Engineering Technology program.

Courses in the Engineering Bridge program (which students for 3rd year Mechanical, Civil, Electrical and Mining Engineering at UVic and UBC) – PHYS 210 and 295 – are unaffected but there is some discussion that Physics 140 and 141 may need to be offered at Interurban as students entering the Bridge program from the revised Technologies program will no longer have completed PHYS 191 and 192.

PHYS 160 Biomechanics for elite athletes, trainers, etc. continues at one section of 35 students; this is a service course for PISE (Pacific Institute for Sport Excellence).

Bob Sedlock, a long-time faculty member, retired in December 2015. We hope that this will allow for the conversion of one of our term faculty members, Stephanie LaForest, to part-time continuing status although this decision has been deferred until Q2S changes have been finalized. Owing to the cuts in the Engineering programs, we are unable to offer work to our second term faculty member, Nicole Prent, in the coming year.

Chris Avis and Nancy Luick
Department of Physics & Astronomy
Camosun College

Capilano University Physics Department Report to the 2016 Physics Articulation Committee Meeting, CNC May 6, 2016

This year we offered: introductory physics (PHYS 104 x3), “calculus-based” (PHYS 114 x4 , 115 x2), Physics for Engineers (PHYS 116 x2) and (PHYS 110 x1 , 111 x1) as well as our astronomy course ASTR (106 x2). Compared to 2014-15 we are down one section of PHYS 104 and up one section of PHYS 116. The additional offering of PHYS 116 resulted from expansion in Engineering.

For 2016-17, we will be able to offer the same courses as 2015-16 but with an additional section of PHYS 115 as well as two other courses. Firstly, we have had a new course approved: APSC 278: Materials Science for Engineers. Secondly, the faculty of Motion and Picture Arts (MOPA) has purchased a service offering of SCIE 410: the Science of Sound and Light.

Total enrollments are up about 5% from the 2014-2015 academic year. Enrolment is climbing back to 2013-14 year levels and is expected to return to 2013-14 levels with the addition of the MOPA section and with students in the expanded Engineering Transition Program (from 35 to 70 students) entering their second year.

We are in the final stages of approval for re-purposing our Associate of Science: Physics degree to an Associate of Applied Science with a similar structure but with a more latitude for second year choices. The intent is to achieve more transferability to Engineering specialties.

Knight “College Physics” was used this year in PHYS 104 (replacing Giambattista). All other textbooks remained the same but we are considering textbooks and electronic platforms to support the assigned work in our other courses.

Bruno Tomberli completed the second year of his two year term as the convenor of the Physics department. Lauren Moffatt will be taking over as convenor of Physics starting August 2016.

College of New Caledonia

2016 Physics Articulation Report

CNC continues to offer calculus based (Phys 101/102, Phys 204) and algebra based physics courses (Phys 105/106) to accommodate first year engineering transfer and general science transfer programs. We observed similar enrolment in calculus based physics as last year and a small increase in algebra based physics enrolment:

- Phys 101 - Introductory Physics I - 42 students
- Phys 102 - Introductory Physics II - 32 students
- Phys 105 - General Physics I - 17 students
- Phys 106 - General Physics II - 12 students
- Phys 204 - Mechanics I Statics - 20 students

Algebra based Phys 105/106 lectures were offered via video conference from Quesnel to Prince George. The labs were delivered locally in Quesnel and Prince George. Online Phys 101 and Phys 102 were not offered this year. Instead, we started delivering calculus based Phys 101 and 102 in the off-semester.

The Physics Department also offers two physics courses, MRAD 113 and MRAD 245, which service the Medical Radiography program, with a maximum enrollment of 16 students.

Barbara Rudecki
Department of Physics & Applied Science
College of New Caledonia

**College of the Rockies
University Studies – Physics
2016 Articulation Report**

College of the Rockies offers four first year physics courses:

- Phys 103 – Intro to Physics I
- Phys 104 – Intro to Physics II
- Phys 141 – Engineering Statics
- Phys 170 – Engineering Statics & Dynamics

Enrollment in Phys 103 this year started at 24 students, and dropped to 21 by the end of the semester. Enrollment in Phys 104 the following semester dropped to 14 students, mainly resulting from students who had difficulties in their Calculus course.

Enrollment in Phys 141/170 (offered in the Jan-Apr semester) have a combined enrollment similar to Phys 104, with most students taking 141 and a small number taking 170.

College of the Rockies offers two second year physics courses:

- Phys 201 – Analytical Mechanics
- Phys 202 – Introduction to Modern Physics

Enrollment in these courses is low, but steady. Typically there are fewer than 5 students each year.

We also offers an astronomy course in the fall semester:

- ASTR 100 – Elementary Astronomy

This course draws students from the university studies department as well as general interest enrollments from people in the local community.

Trevor Beugeling
Instructor
University Studies – Engineering, Physics, Computer Science
College of the Rockies
Cranbrook, BC

Columbia College
2016 Physics & Astronomy Articulation Report
May 6, 2016 - CNC

Columbia College is completing our third year at our new campus and enrollment is at a record high for the college. To meet the demand, the college has expanded the day by an hour and offers a selection of Saturday classes (no physics classes have been offered on Saturdays so far). The physics department has grown due to demand and consists of two full-time faculty members, one part-time sessional, as well as a lab technician.

In 2015/16 Columbia College ran eight Physics courses, with six of them at the UT level and 2 at the secondary level:

- Physics 110 (Calculus based Newtonian Mechanics)
- Physics 120 (Calculus based Electricity and Magnetism)
- Physics 130 (Calculus based Optics and Thermodynamics)
- Physics 118 (Engineering Mechanics)
- Physics 200 (Introduction to Modern Physics)
- Physics 205 (Thermal Physics)
- Physics 11
- Physics 12

The enrollment is fairly stable in our UT program. Throughout the 2015-2016 academic year, there has been a total of 5 sections of Physics 110, 3 section of Physics 120, 1 section of Physics 130, and 1 section of Physics 118 offered. Physics 200 has been offered two times, and Physics 205 has been offered once. Physics 200 and 205 are offered in alternating semesters.

Enrollment in Physics 11 is continuing to stay fairly low, and the enrollment in Physics 12 has also been slightly lower than in the past. Throughout the year, Physics 11 and 12 courses are offered in alternating semesters.

We have recently prepared a second year Electromagnetics course that has been submitted for articulation and are preparing a basic physics for non-science students to be articulated in Summer 2016.

Tara Todoruk
Columbia College
Vancouver, BC

Coquitlam College

No changes in Physics curriculum at Coquitlam College. We offer only the 1st year calculus-based Physics courses: Physics 101 (mechanics with an introduction to thermal Physics) and Physics 102 (electricity, magnetism and optics). Physics 101 is offered in the summer and the fall semesters, Physics 102 is offered only once a year in the spring semester. No plans for the second year courses. The enrolment so far has been stable and good. As a rule, the classes of Physics 101 are full (100%), and the number of students enrolled in Physics 102 range from 16 – 20 (80 -100%). In the fall semester the number of students frequently increases above the laboratory space limit so that a second lab section has to be open.

New Engineering Essentials Program and New Lab Spaces

Our new Engineering Essentials program had its first cohort in the Fall of 2015. We had 7 students enrolled. It offer either a certificate (1 year) or diploma (2 year) credential. The certificate credential leverages Douglas' existing course offerings to provide the base math, science, and academic writing courses for most Engineering school bound students. The diploma credential adds additional technical courses in mechanical fabrication, electronics prototyping, and embedded systems. As well, students will finish the diploma program with a technical project course and an introductory business course.

Renovations to build the new lab space at the New Westminster Campus are ongoing. Jackhammers are a constant background noise now. We are increasing the physical foot print of the college and will have a brand new physics lab as of September 2016 with the new engineering courses on mechanical fabrication, electronics prototyping, and embedded systems being run in the summer of 2017 in their new lab space.

More information can be found on our web site at
<http://www.douglascollege.ca/programs-courses/faculties/science-technology/engineering/engineering-essentials-diploma>

We had 84 applicants for the Fall 2016 cohort. We continue to work on transfer agreements with SFU and UBC and looking forward to this articulation. Allan Madjanac from our math department is the Engineering Coordinator. All enquiries should be sent to engineering@douglascollege.ca

Our overall student numbers in physics were about the same this year as last year, with our Coquitlam campus continuing to have smaller classes. The Evergreen Skytrain is supposed to be finished February 2017 so and we hope it will bring more students to that campus.

With the large number of applications for the engineering diploma we hope to be offering more of the associated physics and math courses very soon. As mentioned, the new dedicated engineering courses are scheduled for the summer of 2017. We hope to be hiring a part-time faculty soon and will be hiring a contract faculty for a single course in the Winter of 2017.

Open Source Textbook & Free Resources

As part of our efforts to ease the financial burden on students, we have started exploring the use of open source textbooks. To that end, we now use the Open Stax College Physics textbook for PHYS1104 (Physics 11 equivalent) and PHYS1107 (first year algebra based Physics.) The textbook is offered free of charge for students to download as a PDF.

By the end of the summer, there will be a PressBooks version of Open Stax College Physics (algebra based) available on the BCcampus web site. PressBooks is the editing program chosen by BCcampus. It is easy to export the book into a variety of formats and most importantly, easy to modify so you can create your own version. We have hired a student who has been working on this project since March. The equations are the challenge, of course, as you have to use the HTML editor.

Open Stax has a calculus based University Physics course that will be available soon and we will be reviewing that book once it is fully available.

Open Stax has an Astronomy book that will be available soon and I have seen enough of that to know that I will be using it in the astronomy classes starting September 2016.

Open Source Computer Resources

With respect to free software in our engineering program, we use Sketchup Make for the computer CAD work in our Engineering Graphics course. Additionally, students use WxMaxima, the open source Computer Algebraic System, to solve problems in our Mechanics course.

Submitted by Jennifer Kirkey

Kwantlen Polytechnic University

Physics & Astronomy Articulation Report, 2016

In the Fall 2015 the length of the semester changed from 14 weeks to 13 weeks.

In September 2016 we will be moving in to third year of PMT (Physics for Modern technology) degree. This year we had 10 second year students, most of whom will be taking 3rd year courses in the fall. We also had 21 PMT-intended students taking first year courses and 6 PMT-intended students who were taking upgrading courses. For the Fall 2016 we have 43 applicants who indicated PMT as their first choice program and 116 applicants who indicated PMT as their second-choice program.

Note: Students can take first year courses at other institutions and transfer to KPU for their second year. Also, students taking Physics & Math courses at other institutions get credit for many of our second year courses if they transfer to PMT.

While our enrolments in Physics courses at Surrey campus remain quite healthy, the enrolments at Richmond campus decreased. This has occurred for all science courses. Enrolments in Physics 1120, 1220 & 1170 might also be affected by the decision of KPU administration mandating that only up to 50 highly selected students (only 40 were admitted in September 2015) who would finish first year engineering in 8 months can declare themselves as Engineering students. Those who would take engineering on a part-time basis can be accepted as undeclared Faculty of Science & Horticulture students. Only a few students chose this path in September 2015, while in past years there were many.

Astronomy 1100 remains in demand. In the Fall we offered three sections, in the Spring four and in the Summer one section. In addition to it in the Fall we teach ASTR 3110 and in the Spring ASTR 3111 that also fill up with 35 students.

Jana Kolac
Physics department, KPU

Langara College Physics and Astronomy
Articulation Report 2016

Terry Coates: *tcoates@langara.bc.ca*

We had extremely strong first-year enrolments in the 2015-2016 academic year. We ran 39 sections of physics and astronomy courses; 7 in Summer 2015, 15 in Fall 2015 and 17 in Spring 2016. We had waitlists for the majority of these sections. 3 of the sections were added because of an increase in international student registration.

Astronomy Courses

We ran ASTR 1102/3311 (one half-section of 1101 (for Science students) and one-half section of 3310 (for Arts students)) in the fall with the similarly organized ASTR 1101/3310 course in the spring. As with the previous year we are still seeing a decline in enrolment for the 3310/3311 sections which may be due to the competition from a growing number of elective arts courses being offered at the college.

Introductory Courses

We ran 1 section of PHYS 1114 (Grade 11 equivalent) in the summer and another 2 sections in the fall and 2 in the spring. Registration has held consistent in these courses.

We ran 10 sections of PHYS 1118 (Grade 12 equivalent) which is one of our most popular courses. There were waitlists for this course every semester. For this course we use the OpenStax College Physics textbook, which is free to all students.

1st-Year Courses

We ran 10 sections of PHYS 1125 (Physics I with Calculus) and 3 sections of PHYS 1101 (Physics I for Life Sciences). PHYS 1125 is very popular and we have had waitlists for this course. For 1125 we ran 5 sections in the fall and 4 sections in the spring as well as 1 section in the summer. For 1101 we run one section every semester although this course is seeing lower enrolment numbers as 1125 enrolment increases.

We ran 4 sections of PHYS 1225 (Physics II with Calculus). We are getting increasing enrolment and demand for this course as more students are taking the preceding course PHYS 1125. One of the sections of PHYS 1225 in the spring (and one of the PHYS 1125 sections in the fall) primarily consists of the students in the Engineering Transfer Program.

2nd-Year Courses

We ran our 2nd-Year physics program this year. In the fall semester we had 14 students in PHYS 2424 (Relativity and Quanta) and 10 students in PHYS 2309 (Intermediate Physics Lab I). In the spring semester we had 19 students in PHYS 2323 (Newtonian Mechanics) and 7 students in PHYS 2409 (Intermediate Physics Lab II). This represents an increase in numbers over the previous year.

Other Courses

We ran 3 sections (one each semester) of PHYS 1219 (Engineering Mechanics). We fill the spring semester section and end up with a substantial waitlist but we see lower enrolments in the fall and summer semesters

General Notes

Except for the ASTR courses (and core course sections reserved for the ENGT students) we have 50% of each section (approx. 15-16 spaces per section) held for International Education (IE) students. As we get closer to the semester starting date any unfilled IE spaces are opened up to domestic students on the waitlist.

Like many other institutions, the college has been expanding and diversifying its recruitment of international students and we have begun welcoming a growing number of students from India. A large portion of these students are interested in getting into STEM fields and as a result we are being allocated more physics sections to accommodate the increasing demand. As well, we are offering a new Diploma in Applied Science which is designed for students who wish to study university engineering, but do not yet meet all the pre-requisites, or who need time to transition into the heavy workload that the study of engineering requires. The physics department has been giving extra sections in order to accommodate demand for this program.

Construction on our brand-new Science and Student Services building is on schedule and we will be moving in this August (2016) with full operation scheduled for the Fall 2016 semester. We will have 3 dedicated lab rooms in the new department—two rooms will be labs for undergraduate courses and the third room will be a dedicated studio physics room.

Langara College has also made a transfer agreement with Queen's University. Students who have completed an Associate of Arts or Associate of Science degree at Langara can transfer into 3rd year Arts and Science at Queen's. This partnership is a first for an Ontario university and a college in BC.

NIC Physics Articulation Notes 2016

We have had no change in our physics offerings since last year. Our transfer courses in physics are:

- PHY 100/101 – Algebra based physics, for life sciences
- PHY 120/121 – Calculus based physics, for engineers, physicists, and most chemists
- PHY 141/170 – Engineering Mechanics (PHY 141 transfers to UVic Engineering, and PHY 170 transfers to UBC Engineering).

Enrollment in both streams of first year physics continue to be strong at our Courtenay Campus, and we have had modest gains in Campbell River and Port Alberni campuses, where the courses are typically delivered by ITV (teleconference), with labs delivered face to face at each campus.

We did not offer our Space Science and Astronomy courses again this year, but it is part of our department's multi-year plan to bring it back. We are also hoping to investigate collaborating with one or more other institution to be able to offer some second-year physics and math.

Northwest Community College Physics Articulation Report 2016

Northwest Community College (NWCC) serves the rich and diverse communities and learners of BC's beautiful northwest region including Haida Gwaii and the Great Bear Rain Forest. Aboriginal peoples comprise roughly 30 percent of the region's population, the highest among all BC college regions and, at NWCC, Aboriginals make up roughly 40 per cent of the student body. The university credit program has lost two more fte faculty members with 13 remaining across the region, down from 27 several years ago.

We continue to run one section of algebra based physics 101/102 (using Giancoli) at the Prince Rupert Campus and one section of calculus based physics 121/122 (using Fundamentals of Physics, Halliday, Resnick, & Waker) and one section of physics 101/102 at the campus in Terrace. At the Terrace campus the students for 101/102 and 121/122 share the same lab time. At both campuses the class sizes are maxed out at 18 which is the maximum permitted in our lab. Both courses have 3 hours of lecture and 3 hours of lab each week for fourteen weeks and then one week for final exams in each term (Fall and Winter). Most of our advanced physics students continue in an engineering program at another institution.

Enrolment was lower at both campuses, with 12 total in Terrace and 4 in Prince Rupert which is a decrease from last year (16 and 6). The low enrolment is partly due to a scheduling conflict with statistics.

No significant change in curriculum, but we are likely to adopt an open text for next year, which will be decided within the next few weeks.

Regan Sibbald

Regan Sibbald
College Professor - Physics and Mathematics
NWCC Terrace
rsibbald@nwcc.bc.ca
(250) 635-6511 ext. 5253

Okanagan College – 2016 Physics & Astronomy Articulation Report

Okanagan College has four campuses: Kelowna, Vernon, Penticton, and Salmon Arm. Kelowna is our largest campus, making up ~65% of Arts & Science students.

A quick look at enrollments:

- Science numbers were down slightly (-0.6%) from 2014-15 to 2015-16, with campus breakdowns as follows: Kelowna (+6.3%), Penticton (-14.3%), Vernon (-11.3%), and Salmon Arm (-10.7%).
- Arts numbers were up slightly (+0.8%) from 2014-15 to 2015-16, with campus breakdowns as follows: Kelowna (+0.6%), Penticton (-3.3%), Vernon (+8.1%), and Salmon Arm (-6.8%).
- First-year Physics numbers were up 6.0% overall from 2014-15 to 2015-16. Our calculus-based courses (OC PHYS 111/121) were down 26.3%, but our algebra-based courses (OC PHYS 112/122), which account for 60–65% of first-year Physics students, were up 24.2%.
- We offered three second-year Physics courses again this year: Modern Physics (OC PHYS 200), with 5 students compared to last year's 6; Thermodynamics (OC PHYS 215), with 11 students compared to last year's 13; and Statics & Dynamics (OC PHYS 202), with 10 students compared to last year's 7. The Thermodynamics course is part of the ELEC and CIEN "Bridge" programs into UBC-O Engineering. The Statics & Dynamics course is part of the Engineering stream in Applied Science.
- First-year Astronomy numbers were up 7.4% from 2014-15 to 2015-16. Our Astronomy courses (OC ASTR 11X/12X) draw both Arts and Science students. The modest increase in student numbers from last year to this year reflects a levelling off in Arts enrollments after significant drops in the preceding three years.
- We offered two second-year Astronomy courses again this year: Astrobiology (OC ASTR 220), with 9 students compared to last year's 6; and History of Cosmology (OC ASTR 230), with 11 students compared to last year's 8. These courses draw Arts, Science, and Business students.

Applications in Science are up 7.5% for Fall 2016 compared to Fall 2015 (for the same March 11 reporting date), with campus breakdowns as follows: Kelowna (+0.6%), Vernon (+24.3%), Penticton (-6.7%), and Salmon Arm (+280%). Applications in Arts are up slightly (+0.6%) for Fall 2016 compared to Fall 2015, with campus breakdowns as follows: Kelowna (-6.4%), Vernon (-5.6%), Penticton (+19.5%), and Salmon Arm (+200%).

We have one faculty member retiring this summer. We are currently looking for a full-time continuing replacement. The posting for this position closes on March 27. The appointment starts in August. We expect one more retirement in the next 1–3 years.

The Penticton campus will be hosting the annual meeting of the American Physical Society (Northwest section) on May 12-14. Please visit the meeting website for more information: <http://www.okanagan.bc.ca/APSNW-Pen2016>.

Ryan Ransom.



Selkirk College

Physics and Astronomy Articulation Report

May 2016

Selkirk College continues to offer the same physics courses in 2015-2016 as in the previous year. Our physics courses serve students in the first year Engineering Transfer program, the Rural Pre-medicine program, as well as general arts and science students. No major changes occurred to the physics courses in 2015-2016.

The courses offered include:

- PHYS 102/103 – Algebra-based.
- PHYS 104/105 – Calculus-based.
- PHYS 200 - Principles of Mechanics, for engineers.
- Astronomy 102, for arts students, not offered since 2013.

Textbooks remain the same for the past three years:

- *Physics* (9th ed.) by Cutnell & Johnson, for 102/103.
- *Fundamentals of Physics* (10th ed.) by Walker et al., for 104/105.

Enrollment in physics courses at the Castlegar campus has increased significantly. In averaging the increase over all the courses, we have a 150% increase in comparison to last year, as well as to the year before. This is due to a nearly full Engineering program as well as a novel influx of students from the newly created Rural Pre-medicine program. We expect similar enrollment for the upcoming year.

SFU Departmental Report 2016

There have been several major curriculum changes in the past year, particularly to the lab stream and Honours programs.

The list of introductory streams remains the same, except that PHYS 100, currently using Knight's College Physics and Mastering Physics, will switch to OpenStax in 2016 and will likely be paired with an alternate online platform, such as Sapling Learning or Wiley Plus. This move is primarily motivated by cost (MP alone runs about \$75) but also technical difficulties with the MP system.

First-year Textbook Summary:

Physics 100 (physics 12): Knight, Jones and Field - College Physics → OpenStax College Physics

Physics 101/102 (algebra): Giancoli - Physics: Principles with applications

Physics 120/121 (calculus): SmartPhysics + Tipler (optional)

Physics 125/126 (enriched): Halliday, Resnick and Krane

Physics 140/141 (studio): SmartPhysics + Tipler (optional)

Enrolment is steady for the introductory courses. Enrolment in 200- and 300-level courses is up 20-40% in the last several years. This is creating welcome enrolment problems in lab courses. It is not clear if this represents an ongoing trend or is a short-term fluctuation.

In 2015-16 we piloted our new introductory lab curriculum, PHYS 132-1 and 133-1. The philosophy behind these labs is to teach more authentic experimentation skills. Each of the eight 3-hour lab sessions is based around a single measurement. In each experiment, students follow a sequence: estimate and explore, measure, analyze and compare, and refine. The labs were designed so that there were important data collection techniques or systematic effects that would likely be missed on the first iteration and could be refined. We avoided any sort of “confirmation experiment” or tasks that attempted to teach significant Physics concepts. We also scaffolded data analysis techniques (estimation, spreadsheeting, graphing, fitting) as well as uncertainty analysis through the two-course sequence. Both courses culminate in “black box” experiments wherein students must use techniques learned throughout the course to identify unknowns inside a black box (torsion pendulum of unknown geometry and composition, electrical circuit with multiple components). Student response was generally positive in our initial offerings. Future curriculum development will examine the skill progression and scaffolding throughout the entire undergraduate lab sequence.

We also piloted a new yearlong undergraduate seminar course, PHYS 201. The primary goal of this course is to enrich the student experience beyond their academic training. It exposes them to opportunities available to students with a physics degree – including academic research opportunities, industrial physics, and nontraditional careers – and fosters skill necessary for success. This course is required for students majoring in any Physics program.

Lastly, we have changed the requirements for all Honours degrees. SFU lowered their credit requirement for an Honours degree from 132 to 120 several years ago. We have lowered all of

our Honours degree requirements to the lowest possible level without sacrificing any content (i.e. only losing general electives). Most degrees now require 120 units, except for some interdisciplinary programs that still require slightly more (e.g. Biological Physics Honours at 126 units).

Jeffrey McGuirk, Undergraduate Chair, Dept. of Physics, SFU

Articulation Report
CNC, Friday May 6, 2016

Enrolments for 2015-2016 (# of students after stable enrolment date)

Fall Semester

ASTR 1140 – The Solar System	61
PHYS 1010 – Physics for Future Leaders	25
PHYS 1100 – Fundamentals of Physics 1	104
PHYS 1150 – Mechanics and Waves	43
EPHY 1150 – Physics for Engineers 1	58
PHYS 1510 – Applied Physics 1	22
PHYS 1580 – Physics for Respiratory Therapists	<u>48</u>
	361

Winter Semester

ASTR 1150 – Stars and Galaxies	63
PHYS 1200 – Fundamentals of Physics 2	86
PHYS 1250 – Thermodynamics, Electricity and Magnetism	22
EPHY 1250 – Physics for Engineers 2	58
EPHY 1990 – Introduction to Engineering Measurements	48
PHYS 1610 – Applied Physics 2	<u>22</u>
	299

Summer Semester

ASTR 1140 – S15	43
ASTR 1150 – S15	14
ASTR 1140 – S16 registration ongoing, numbers as of Apr 15	32
ASTR 1150 – S16 registration ongoing, numbers as of Apr 15	17

Texts

- ASTR 1140/1150 – The Solar System, Stars and Galaxies, Seeds & Backman (8th, 9th eds.)
- PHYS 1100/1200 – College Physics, Serway & Vuille (10th ed.)
- PHYS/EPHY 1150/1250 – Physics for Scientists & Engineers, Serway & Jewett (9th ed.)

B.Sc. Degree

No change to the Physics program, enrolment is stable (although numbers are low in calculus-based courses compared to past years). Typical enrolments in 3rd/4th year courses: 8 to 11 students.

List of First-Year Labs

PHYS 1100

- 1) Measurement & Uncertainty
 - 2) Graphs & Simple Pendulum
 - 3) The Lab Report & Air Track (F)
 - 4) Vector Addition of Forces
 - 5) Collisions in 2-D
 - 6) Buoyancy
 - 7) Specific Heat (F)
 - 8) Hooke's Law (F)
 - 9) Standing Waves in a String
- + lab exam & online pre-labs

PHYS 1150

- 1) Uncertainty Calculations & the Lab Report
 - 2) Graphs & the Optical Lever
 - 3) Thin Lenses & Mirrors
 - 4) Interference
 - 5) Trajectory (F)
 - 6) Collisions in 2-D
 - 7) Hooke's Law (F)
 - 8) Standing Waves on a String
 - 9) Sound Waves
- + lab exam

PHYS 1510

- 1) Graphs
 - 2) Acceleration in 1-D
 - 3) Friction
 - 4) Newton's Laws & Concurrent Forces
- Buoyancy
- 5) Loaded Beam
 - 6) Centroids
 - 7) Pin Jointed Structures
 - 8) Simple Machines

PHYS 1200

- 1) Interference Phenomena
 - 2) Refraction in Prisms (F)
 - 3) Thin Lenses & Mirrors
 - 4) Hydrogen Spectrum (F)
 - 5) DC Circuits
 - 6) Capacitors
 - 7) Magnetic Field in a Solenoid (F)
 - 8) Deflection Tube
 - 9) Radiation Lab
- + lab exam & on-paper pre-labs

PHYS 1250

- 0) Uncertainties and Graphing (EPHY 1250)
 - 1) DC Circuits
 - 2) Introduction to Oscilloscopes
 - 3) Electric Field Mapping (F)
 - 4) Deflection Tube
 - 5) Magnetic Field in a Solenoid
 - 6) Coefficient of Linear Expansion (F)
 - 7) The Ideal Gas Law
 - 8) Specific Heat of a Metal (F)
 - 9) The Heat Engine
- + lab exam

PHYS 1610

- 1) Ultimate Strength
 - 2) Stress versus Strain
 - 3) Deflection of a Beam
 - 4) Pressure at a Depth in a Liquid &
- 5) Fluid Flow in a Straight Pipe
 - 6) Specific Heat
 - 7) Coefficient of Linear Expansion
 - 8) Vibration of a Cantilevered Beam

- 9) DC Circuits
- 10) DC Circuits, cont'd.
- 11) AC Circuits & Transformers

- 9) Standing Waves in a String
- 10) Snell's Law of Refraction
- 11) Mirrors & Lenses

PHYS 1580

- 1) Experimental Error (F)
- 2) Boyle's Law and Absolute Zero
- 3) Buoyance & Pressure at a Depth
- 4) Fluid Flow (F)
- 5) Pitot Tube
- 6) Bernoulli's Equation (F)
- 7) Electricity 1
- 8) Electricity 2
- 9) Wheatstone Bridge
- + *lab exam*

Physics at Trinity Western University

Report for the BC Articulation Committee Meeting

6 May 2016

by Dr. Arnold E. Sikkema

Professor of Physics

Chair of the Mathematical Sciences Department

Trinity Western University

- TWU Physics mainly serves our B.Sc. programmes in Biology and Chemistry, as well as our pre-engineering options, but also offers one course each year for non-science students.
- Physics is part of our Department of Mathematical Sciences, which includes math, computing science, physics.
- Enrolment in our first-year calculus-based physics sequence (with lab) was about normal for the fall (61) & spring (42), but failure rates were very high this year: 7 & 5 respectively. (Most who failed were overconfident and unengaged, and failed every course they took!) We continue to use Knight's *Physics* (3rd edition) and *MasteringPhysics* for these courses, though I am considering Mazur instead of switching to the 4th edition of Knight for 2016-17.
- All our other courses are offered on an alternate year basis, to allow students to complete a minor or concentration, with zero to three graduating per year with these options (none this year).
- Enrolments in 2015-16 were:
 - 111: Fundamentals of Physics I: 61
 - 111: Fundamentals of Physics II: 42
 - 215: Astronomy (taught by adjunct professor Dr. Barry Pointon from BCIT): 16
 - 220: Mechanics: 9
 - 240: Physical Chemistry (with lab, and cross-listed with Chemistry): 21
 - 360: Optics, with lab: 2
- Courses planned for Fall 2016 are:
 - 111: Fundamentals of Physics I
 - 210: Conceptual Modern Physics
 - 341: Advanced Physical Chemistry (with lab, and cross-listed with Chemistry)
- Courses planned for Spring 2017 are:
 - 112: Fundamentals of Physics II
 - 230: Electricity & Magnetism (with lab)
 - 310: Modern Physics

Articulation Report 2015-16 - UBC Okanagan

During the past academic year, first-year Physics enrolments have recovered slightly from a dip last year. In the fall term, combined enrolments in the algebra- and calculus-based streams amounted to 526 (vs 498 last year), and in the spring term the combined total was 482 (vs 448 last year). These numbers are, however, significantly lower than two years ago.

Second- and upper-year enrolments in Physics are, steadily growing. Second-year class sizes ranged from 17 to 72, averaging to 34. Upper-level class sizes ranged from 10 to 36, averaging to 25. The number of students graduating in Physics is up sharply this year over last, with 24 in total (8 in Honours, 12 in the Major, 1 in the Minor, and 3 in the Combined Math/Physics Major). There are no curricular innovations at the first-year level to report this year. Discussion continues (as it has for a couple of years) of eliminating the algebra-based stream in first year, and subsuming it into the regular calculus-based stream with additional tutorial time provided for the less-prepared students who would formerly have chosen the algebra-based stream. This change would be accompanied by making Calculus a corequisite for all first-year Physics students. Since first-year Physics is a requirement for all Science degrees, other departments have a say in this, and resistance is expected.

We have introduced a suite of three upper-level courses in Medical Physics and Medical Imaging. This accompanies the introduction of a new Medical Physics postgraduate program that has just received Ministry approval, and which is enrolling its first graduate students for the coming fall semester. Two new faculty members have been hired this year to serve the needs of this program, and will be taking up their positions this summer. Together with another faculty member who arrived two years ago to initiate the Medical Physics program, these personnel will form the first “research cluster” in Physics at UBCO, and will likely set the direction for educational as well as research initiatives for the foreseeable future.

Murray Neuman

Assoc. Prof., Physics, UBC Okanagan

UBC-Vancouver Physics Articulation Committee Report

Tom Mattison

May 4, 2016

This is the end of the first year with significant curriculum changes: the creation of PHYS 117 (calculus-based mechanics for physical sciences with no lab component), and the splitting of the previous PHYS 102 (calculus-based E&M with lab component) into PHYS 118 (calculus-based E&M with no lab component) and PHYS 119 (lab course to support PHYS 117 and 118). The one lecture section of PHYS 117 replaced one section of PHYS 101 (barely-calculus-based and oriented toward life-science rather than physical-science).

PHYS 117 enrollment was 229, while PHYS 101 enrollment declined from 1594 (2014) and 1671 (2015) to 1353 (2016). So the change in total first-term physics enrollment was relatively small. PHYS 118 enrollment was 427, compared to PHYS 102 enrollment of 520 (2014) and 532 (2015). It was hoped that removing the lab component of PHYS 102 would result in higher enrollment in PHYS 118, but this clearly did not occur. However in 2016, the Coordinated Science Program (a first-year cohort program with about 170 students) decided to no longer require PHYS 102/118, which certainly explains some, perhaps most, of the decrease in enrollment. PHYS 119 lab enrollment was 228. Our estimate was that about half of the PHYS 102/118 students would register for the PHYS 119 lab, and that seems to have been fairly accurate. Enrollment in ASTR 310 for Arts students has increased to 143, compared to 97 (2015), 106 (2014), 184 (2013). Enrollment in ASTR 311 was 61, compared to 55 (2015), 97 (2014), 146 (2013).

There are currently 92 fourth-year physics & astronomy students: 36 majors physics or astronomy, 19 honours biophysics, 18 combined-honours physics, 14 honours physics or astronomy, and 5 combined-major physics. There are 56 students who have applied to graduate this year, compared to 46 (2015), 70 (2014), 57 (2013), and 49 (2012). We also graduate about 50 students in engineering-physics each year.

Colleges may wish to change their articulation agreements with UBC-Vancouver due to our first-year curriculum changes.

If you offer a mechanics course that does not have a lab component, it probably transfers as PHYS 1st rather than PHYS 101, which is not very useful to students. But it could now transfer as PHYS 117, which would be useful. If you offer an E&M course that does not have a lab component, it probably transfers as PHYS 1st rather than PHYS 102, which is not very useful to students. But it could now transfer as PHYS 117, which would be useful.

If you have a stand-alone physics lab course, you should change the articulation agreement so it transfers as UBC PHYS 119.

If your courses do have lab components, they probably transfer as PHYS 101 or PHYS 102 at present. PHYS 101 and 102 are still valid pre-requisites for other courses (and PHYS 101, with its lab component, is still taught), so there is no immediate need to change the articulation agreements in this case. But you may wish to change the articulation for a mechanics course with a lab component plus an E&M course with a lab component to UBC PHYS 117+118+119.

University of the Fraser Valley Physics Department

Articulation Report - May 6, 2016

UFV offers a minor, major, and honours program in Physics within the BSc, along with a 2 year Engineering Physics diploma (starting after a year of both physics and math courses at the first year level).

This past year saw our overall enrolments increase from 1012 last year to 1032 this year, which includes our Engineering Transfer Program, as well as our new Diploma in Engineering Physics. The breakdown as of the stable enrolment date is shown in the following table. The number in column 2 represents the maximum class size, that in column 3 the actual enrolments.

ABE Physics (Grade 11)	2 Sections of 24	48 Students (48 Last Year)
First Year Astronomy	2 Sections of 36	72 Students (72 Last Year)
First Year Algebra Based Physics	3 sections of 36	100 Students (80 Last Year)
First Year Calculus Based Physics	10.5 Sections of 36	360 Students (394 Last Year)
Second Year Physics	4.5 Sections of 24	88 Students (61 Last Year)
Upper Level Physics	8.5 Sections of 24	125 Students (155 last Year)
Engineering (1 st to 3 rd year)	11.5 Sections of 24 or 36	263 Students (202 Last Year)

We had a decrease in both first year calculus based courses as well as upper level courses, but an increase in our second year and engineering courses (this due to the new Diploma). The smaller number in the upper level courses can be attributed to the fact that as most of the Diploma students were also completing a Physics Major, the Diploma courses took priority over the upper level courses they would normally have taken. That is, we require 30 upper level credits in Physics for the Major, while the BSc requires 44 upper level credits in order to be considered for graduation. In past years, most students would complete many of the additional 44 credits in Physics, but with the onset of the Diploma, they can find those credits in our Engineering offerings. If we were to count students in the upper level Engineering courses, then the total number of upper level students would increase by 103.

The Diploma program has been somewhat successful, but we are still hoping to see improvements in enrolments for this coming Fall. We are very interested in accepting transfer students who have completed either an engineering transfer program or at least a year of physics and calculus elsewhere. Since the commencement of the program in fall of 2014, we have had less than the 18 student maximum for a cohort each year. We are averaging somewhere in the neighborhood of 12-14 students, and are hopeful that our recruiters can find more students for this next year. India seems to be a fertile market to find students, and with new articulation agreements in place to ease their transfer, we should see an increase in the number of international students coming to UFV. Most of the international students are only interested in the two-year diploma, while the domestic students are opting for both the BSc Degree and Diploma (both can be obtained within 4 years if the proper elective courses are chosen).

We have also opted (along with the rest of the UFV Faculty of Science) to relinquish control of the ABE courses to the Faculty of Access and Open Studies as of this Fall 2016. These service courses were costly to put on, and the Dean of Science suggested that it may be time to hand them over to another faculty. Due to the new cost structure of these courses (increasing from ~\$30 to ~\$500), interest in the course over our normal university level introductory physics has waned. In past years we have attempted to run the two concurrently, but have always had to cancel the 100 level course due to the differing cost (the material is effectively the same). We will again attempt to put on the 100 level course this Fall and see what happens.

Our new Diploma in Engineering Physics will see the first graduating class this coming June, and we have 9 students who will be receiving this credential. Of the 9 students, 7 will also be receiving a BSc majoring in physics. We currently expect to have 16 Physics graduates: 1 Minor, 14 Majors, and 1 Honours. In addition, there are a handful of students who will require one more semester of study (they are only a few credits short), so this Winter should see at least an additional 4 Majors and 6 Diploma graduates. We have four students going on to graduate school this fall (at least that we are aware of), two of which have received NSERC's. Others will be going on to a teaching program, technical college, or directly into the job market. One of our students has been selected to be this year's Student Convocation Speaker, so we are very proud of his achievement. All in all it has been a fairly successful year in terms of our students' success.

Our new hire in engineering, Lin Long, has noticed that if a student takes both our Diploma and our Major (with a careful choice of electives) they are only about 5 courses away from a full accreditable degree in Engineering Physics. The Department has agreed to move forward cautiously to bring about this degree, but given the current climate at UFV, we do not anticipate this happening very soon.

Our Department (along with many others in Science) has had some issues with sessional instructors this past year. We will be more proactive going forward, and plan to institute a more rigid mentoring program for incoming sessionals to ensure their success. With the increase in the number of sessional lecturers required, this problem is one which will likely be recurring. We currently have 7 fulltime faculty members to cover the various course offerings: 2 lab instructors and 5 lecturers. This is supplemented by roughly the same number of sessionals, where the number of sessional sections (both lab and lecture) are around 40%. This coming year we have been allotted 2 Limited Term Appointment (LTA) positions, which will cover the equivalent of two fulltime faculty members. In addition, we will still require a few sessionals to cover both lab and lecture sections (many more of the former, and fewer of the latter). We also had an increase to our Departmental Assistant's position, where we now share an 80% (up from 60%) fulltime with the Chemistry Department.

Our Department will be undergoing a departmental review this coming year, and seeing that many of the suggestions made during the last one (5 years ago) were not met, we expect to see them arise again. These include: more space and equipment for upper level labs, at least one more fulltime hire, and better integration with a Coop program – all of these we have requested, but we have been unable to implement them. Needless to say, we are not anxious to undergo the laborious task of another review.

On the university level, our collective agreement was rejected by the vast majority of our union members last May. Management is trying to bargain starting from the rejected collective agreement instead of the existing collective agreement. Bargaining continues, and we are hopeful that a new contract will be in place by summer's end. Our system of assessing teaching through student evaluations is not to be used in our new rank and tenure system for promotion and job retention, but rather peer review is to be used. It isn't clear who will choose the peers to do the reviewing; this is rather unsettling. Meanwhile our 'faculty standards' committee has defined scholarship as 'creation of new knowledge' and must be peer reviewed. As a consequence our old emphasis on student teaching will have to change to accommodate the new metric.

Respectfully submitted by Jeff Chizma on behalf of the UFV Physics Department.

UVic 1st and 2nd year PHYS and ASTR articulation report, April 2016

1st year PHYS:

There were no significant changes in our offerings this year.

We experienced a stabilization enrolment in our calculus-based offerings, with some decline (!) in the enrolment of in courses aimed at students continuing in Physics.

We expect to split PHYS 102 (algebra-based survey of Physics) into two single-term courses, effective September 2017. There are no plans for a significant change in content or scheduling.

Courses offered:

PHYS 102 (two-term course) – An algebra-based survey of physics.

Normally offered Sept-April.

Primary Audience: Biology students

Text: Serway (algebra based, latest edition)

Enrolment: Initially around 500.

Final enrolment: 2016: 413 ('15: 446, '14: 399, '13: 436)

Topics: Mechanics and energetics, oscillatory and wave motion, fluids, thermodynamics, electricity and magnetism, optics, modern physics

PHYS 110 (first term) and 111 (second term) – A calculus-based survey of physics

PHYS 110 offered Fall (Sept) and Spring (Jan)

PHYS 111 offered Spring (Jan) and Summer (May)

Primary Audience: Natural Science and Engineering students

Text: UVic custom edition Young & Freedman with locally-written supplements.

Enrolment: Initial (fall) enrolment peaks at 750-800

Final enrolment PHYS 110:

Fall 2015: 606 ('14: 609, '13: 566)

Spring 2016: 154 ('15 159, '14: 134)

Final enrolment PHYS 111:

Spring 2016: 460 ('15: 473, '14: 435)

Summer 2016: 96 ('15: 87, '14: 73)

Topics: As for 102, with limited content on fluids and electromagnetism

110 – Mechanics, conservation laws, electric and magnetic forces

111 – Thermodynamics, oscillatory and wave motion, optics, modern physics

PHYS 120 (first term) and 130 (second term) – Physics for Physicists and Astronomers

Normally offered Fall (120) and Spring (130)

Primary Audience: Prospective major/honours students

Text: Young and Freedman – University Physics with Modern Physics (latest edition)

Enrollment: Initially peaks at 120-140

Final enrolment 120: 2015: 88 ('14: 104, '13: 106, '12: 116)

Final enrolment 130: 2016: 58 ('15: 68, '14: 72, '13: 66)

Topics: As for 102 omitting Electricity and Magnetism and Thermodynamics

120 – mechanics and special relativity

130 – rotational motion, oscillatory motion, waves, modern physics

2nd year PHYS:

The University of Victoria offers five second year Physics courses, four of which are common to all our undergraduate programs. These have had fairly stable enrollment for the past years.

Three significant changes are coming to our programs effective fall 2017:

- PHYS 214 to be redesigned as a lab techniques course and renumbered PHYS 229
- PHYS 217 to be moved to 3rd year and renumbered PHYS 317 (moderate content change)
- New 2nd year course “computational mathematics and physics” to be offered starting in spring 2017, required in programs effective fall 2017.

Partially as a consequence of these changes we have not offered PHYS 217 in the summer.

Courses offered:

PHYS 210 (also EOS 210) – Geophysics

Normally offered in the fall.

Primary Audience: PHYS/EOS combined program students

Text: Selections from several books, including Lillie – Whole Earth Geophysics

Enrolment: About 60 (20 as PHYS, 40 as EOS).

PHYS 214 – Laboratory Electronics

Normally offered in the fall.

Primary Audience: PHYS and ASTR major and honours students

Text: Horowitz and Hill – Art of Electronics

Enrolment: 2015: 51 ('14: 54, '13: 46, '12: 46, '11: 41)

PHYS 215 – Introductory Quantum Physics

Normally offered in the spring and summer.

Primary Audience: PHYS and ASTR major and honours students

Text: Varies depending on instructor, usually Thornton and Rex

Enrolment-Spring: 2016: 46, ('15: 35, '14: 32, '13: 48, '12: 44)

Enrolment-Summer: 2015: 15 ('15: 17, '14: 17, '13: 9, '12: 19)

PHYS 216 – Introductory Electricity and Magnetism

Normally offered in the fall.

Primary Audience: PHYS and ASTR major and honours students, and Engineers

Text: Excerpts from Young and Freedman – we are looking for a better text.

Enrolment: 2014: 53 (2013: 54, 2012: 61, 2011: 53)

PHYS 217 – Introductory Thermodynamics

Normally offered in the spring.

Primary Audience: PHYS and ASTR major and honours students

Text: Carter

Enrolment-Spring: 2016: 37, ('15: 36, '14: 27, '13: 46, '12: 34)

1st year ASTR:

The University of Victoria offers three 1st year Astronomy courses, two intended for non-majors and one that is the first course in our ASTR progression.

The number of sections of ASTR 101 and 102 offered has changed in response to the recent retirement of a long-serving staff member.

Courses offered:

ASTR 101 and 102 – Astronomy for non specialists (101-Solar System, 102-Cosmology/Stars)

Primary Audience: General interest

Text: Varies depending on instructor

Enrolment: About 180-200/term in ASTR 101; About 80-100/term in ASTR 102. Summer offering about 60-80.

ASTR 150 – Concepts in Astronomy

Primary Audience: Astronomy major/honours students

Text: Varies depending on instructor

Normally offered in the spring.

Enrollment: 2016: 73 ('15: 83, '14: 67, '13: 55, '12: 45)

2nd year ASTR:

The University of Victoria offers three second-year Astronomy courses, one intended for general interest, and two that form part of our ASTR program. ASTR 201 is a recently developed course.

Courses offered:

ASTR 201 – Search for Life in the Universe

Primary Audience: General interest

Text: Readings

Enrolment: 40-50.

Normally offered in the fall.

ASTR 250 – Introductory Astrophysics

Primary Audience: ASTR major/honours students

Text: Freedman and Kaufman - Universe

Enrolment: 2015: 33 ('14: 24, '13: 30, '12: 21, '11: 20)

Normally offered in the fall.

ASTR 255 – Planetary Science

Primary Audience: ASTR major/honours students

Text: Varies depending on instructor

Enrollment: 2016: 11, ('15: 10, '14: 11, '13: 16, '12: 10)

Normally offered in the spring.

Vancouver Island University

report to the
Physics Articulation Meeting (06-May/16)

1. Student numbers were stable in our 1st year. Life sciences courses (P111/P112) are steady in the first term but down in the second term by another 10% (this year*: 83/56; last year: 82/63) while calculus based courses (P121/P122) have increased slightly from 2015/16 and 2014/15 (this year: 76/51; last year 67/49) but have higher attrition between the first and second terms.

*Enrolment in Nov/2014 (PHYS 111/121) and Mar/2015 (PHYS 112/122)

2. Astronomy continuing to run two 1st year (solar system, stars & galaxies) & two 3rd year (cosmology, history). Numbers have held fairly steady over a few years now (this year 115; last year 114) with classes just slightly under their capacity. A total of eight viewing nights were held over the Fall and Spring semesters. Classes continue to augment traditional visual observing with electronically assisted (near real-time camera based) viewing which has been well received and proven very successful in enormously extending the range of objects available during our observation session and accommodating larger groups more easily/quickly. Visual observing for some objects (moon, planets) still provides a better, more direct experience for the students. Finding the balance between the two types of observing is still a work in progress

A solar scope (H-alpha) and a white-light solar prism are now being used to make dual refractor viewing of the sun possible. The students really enjoyed this - and the views of the solar disk and atmospheric features were impressive for our dual tuner, 80 mm H-alpha scope.

3. PHYS 216 (Introduction to Electromagnetism) was re-launched this year and has an enrolment of seven (7) students. It is expected that next year's numbers will be stronger as a number of engineering students appear to be continuing at VIU for a second year.
4. The annual Extreme Science show (benefiting the charity LED Africa) continues to be popular with 1400 attendees (mostly K-12 students) over five sessions.

Report to UT Physics and Astronomy Articulation 2016
Vancouver Community College

September 2015 saw the first full cohort of 1st year engineering transfer certificate students starting at VCC and as a result, our numbers in physics were noticeably higher. We offered two sections of the first half of our calculus-based 1st year physics (PHYS 1100) in fall 2015. Both sections were quite full. For the first time at VCC we then ran two sections of the second half (PHYS 1200) in winter 2016.

As mentioned last year, Mechanics 1 (PHYS 1170) has been added to the engineering certificate at VCC. This course transfers to UBC as PHYS 170.

Andy Sellwood