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MEMORANDUM

ATTENTION	Senate	DATE	May 8, 2015
FROM	Gordon Myers, Chair Senate Committee on Undergraduate Studies	PAGES	1/1
RE:	Faculty of Science (SCUS 15-12)		

For information:

Acting under delegated authority at its meeting of May 7, 2015 SCUS approved the following curriculum revisions effective Spring 2016.

1. Department of Mathematics (REVISED SCUS 15-12b)

- (i) Upper and Lower division requirement changes to the Operations Research Honours program

2. Department of Physics (REVISED SCUS 15-12d)

- (i) Lower division requirement changes to the:

- Applied Physics program
- Applied Physics Honours program
- Biological Physics program
- Biological Physics Honours program
- Chemical Physics program
- Chemical Physics Honours program
- Physics program
- Physics Honours program

Tabled Item: SCUS 15-12b (ii): Mathematics: Upper and lower division requirement changes to the operations research honours program

This item was discussed and there appeared to be no major problems with the motion.

This item was tabled because SCUS wanted to see that these proposed changes had been approved by the Faculty of Applied Sciences.

In fact there should be no need for an agreement from Applied Sciences in this instance. The Operations Research honours program (and major) has nothing to do with Computer Science or Applied Science. The Operations Research major/honours programs were not created with input from Computing Science and they are not a joint program like the MACM major/honours program, and so doesn't (shouldn't?) need any letter from Computing science or applied Science.

We wish to bring forward the original motion for re-consideration.

Motion II: To change the lower and upper division requirements for the Operations Research Honours Program.

From (Lower and Upper Division Requirements for the Operations Research Honours Program):

Program Requirements

The program requires the completion of 132 units. The Faculty of Science stipulates that a minimum of 48 units must be in upper division, and that additional upper division units will be required to total a minimum of 60 (excluding EDUC 401, 407).

The specific requirements for this particular program are divided into three parts: required lower division courses, required upper division courses, and completion of an interdisciplinary requirement.

In addition to the program requirements set out below, general university regulations must be met.

Computing science courses that are completed in the operations research honours program will count towards the requirement that 12 units must be completed from outside of the Faculty of Science.

A minimum program 3.00 cumulative grade point average (CGPA) must be obtained on the overall major program requirements, as well as a minimum program 3.00 grade point average in the upper division major courses.

Lower Division Requirements

Students complete a minimum total of 33 units, including either one of

CMPT 126 - Introduction to Computing Science and Programming (3)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

or both of

CMPT 120 - Introduction to Computing Science and Programming I (3)

CMPT 125 - Introduction to Computing Science and Programming II (3)

or both of

CMPT 130 - Introduction to Computer Programming I (3)

CMPT 135 - Introduction to Computer Programming II (3)

and all of

CMPT 225 - Data Structures and Programming (3)

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

MATH 208W - Introduction to Operations Research (3)

MATH 251 - Calculus III (3)

STAT 270 - Introduction to Probability and Statistics (3)

STAT 285 - Intermediate Probability and Statistics (3)

and one of

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

MATH 154 - Calculus I for the Biological Sciences (3) *

MATH 157 - Calculus I for the Social Sciences (3) *

and one of

MATH 152 - Calculus II (3)

MATH 155 - Calculus II for the Biological Sciences (3) *

MATH 158 - Calculus II for the Social Sciences (3) *

and one of

MATH 232 - Applied Linear Algebra (3) *

MATH 240 - Algebra I: Linear Algebra (3)

* with a B grade or better

Upper Division Requirements

Students complete a total of 48 units, including all of

MATH 308 - Linear Optimization (3)

MATH 348 - Probabilistic Models in Operations Research (3)

MATH 402W - Operations Research Clinic (4)

and five of

MATH 309 - Continuous Optimization (3)

MATH 320 - Introduction to Analysis II (3)

MATH 408 - Discrete Optimization (3)

MATH 448 - Network Flows (3)

STAT 350 - Linear Models in Applied Statistics (3)

STAT 380 - Introduction to Stochastic Processes (3)

and at least two additional courses from Table I below

ACMA 445 - Loss Models: Estimation and Selection (3) *

ECON 435 - Econometric Methods (5) †

STAT 340 - Introduction to Statistical Computing and Exploratory Data Analysis (3)

STAT 390 - Selected Topics in Probability and Statistics (3)

STAT 410 - Statistical Analysis of Sample Surveys (3)

STAT 430 - Statistical Design and Analysis of Experiments (3)

STAT 460 - Bayesian Statistics (3)

STAT 475 - Applied Discrete Data Analysis (3)

STAT 485 - Applied Time Series Analysis (3)

STAT 490 - Selected Topics in Probability and Statistics (3)

and at least one from Table II below

CMPT 305 - Computer Simulation and Modelling (3)

CMPT 307 - Data Structures and Algorithms (3)

MACM 316 - Numerical Analysis I (3)

MATH 343 - Applied Discrete Mathematics (3)

MATH 345 - Introduction to Graph Theory (3)

MATH 445 - Graph Theory (3)

To complete the required 48 upper division units, students complete additional coursework, of which at least two courses must be 400-level MATH or MACM courses with the possibility of substituting a 400-level course from another department subject to advisor approval. Courses used to fulfil this upper division requirement cannot be used to satisfy the interdisciplinary requirement. All courses pertaining to the required 48 upper division units must be approved by the program advisor in the Department of Mathematics.

* students must meet the entry requirements for the actuarial science program to enrol in this course

† see ECON courses for prerequisites

Interdisciplinary Requirement

With advisor approval, students also complete at least 15 units **from application areas**. Application courses are chosen from **ACMA, BUEC, BUS, ECON, MACM, MATH, REM and STAT courses**. Courses used to fulfil upper division requirements cannot be used to fulfil this requirement. If the operations research honours is completed as part of a second bachelor's degree, then the interdisciplinary requirement may be waived if the previous degree contains an approved major. Approvals are given individually. Those majors that are approved will not be limited to the disciplines listed above.

Faculty of Science Honours Requirements

In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows:

Students are required to complete additional upper division units to total a minimum of 60 upper division units (excluding EDUC 401 to 406)

Students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences

Writing, Quantitative, and Breadth Requirements

Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.

WQB Graduation Requirements

A GRADE OF C- OR BETTER IS REQUIRED TO EARN W, Q OR B CREDIT

Requirement	Units	Notes	
W - Writing	6	Must include at least one upper division course, taken at Simon Fraser University within the student's major subject	
Q - Quantitative	6	Q courses may be lower or upper division	
B - Breadth	18	Designated Breadth	Must be outside the student's major subject, and may be lower or upper division 6 units Social Sciences: B-Soc 6 units Humanities: B-Hum 6 units Sciences: B-Sci
	6	Additional Breadth	6 units outside the student's major subject (may or may not be B-designated courses, and will likely help fulfil individual degree program requirements) Students choosing to complete a joint major, joint honours, double major, two extended minors, an extended minor and a minor, or two minors may satisfy the breadth requirements (designated or not designated) with courses completed in either one or both program areas.

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Residency Requirements and Transfer Credit

The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 as upper division work.

Elective Courses

In addition to the courses listed above, students should consult an academic advisor to plan the remaining required elective courses.

To (Lower and Upper Division Requirements for the Operations Research Honours Program):

Program Requirements

The program requires the completion of 120 units. The Faculty of Science stipulates that a minimum of 48 units must be in upper division, and that additional upper division units will be required to total a minimum of 60 ~~(excluding EDUC 401, 407).~~

The specific requirements for this particular program are divided into three parts: required lower division courses, required upper division courses, and completion of an interdisciplinary requirement.

In addition to the program requirements set out below, general university regulations must be met.

~~Computing science courses that are completed in the operations research honours program will count towards the requirement that 12 units must be completed from outside of the Faculty of Science.~~

A minimum program 3.00 cumulative grade point average (CGPA) must be obtained on the overall major program requirements, as well as a minimum program 3.00 grade point average in the upper division major courses.

Lower Division Requirements

Students complete a minimum total of 33 units, including either one of

CMPT 126 - Introduction to Computing Science and Programming (3)
CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

or all of

CMPT 120 - Introduction to Computing Science and Programming I (3)
CMPT 125 - Introduction to Computing Science and Programming II (3)
CMPT 127 – Computing Laboratory (3)

or both of

CMPT 130 - Introduction to Computer Programming I (3)
CMPT 135 - Introduction to Computer Programming II (3)

and all of

CMPT 225 - Data Structures and Programming (3)
MACM 101 - Discrete Mathematics I (3)
MACM 201 - Discrete Mathematics II (3)
MATH 208W - Introduction to Operations Research (3)
MATH 251 - Calculus III (3)
STAT 270 - Introduction to Probability and Statistics (3)
STAT 285 - Intermediate Probability and Statistics (3)

and one of

MATH 150 - Calculus I with Review (4)
MATH 151 - Calculus I (3)
MATH 154 - Calculus I for the Biological Sciences (3) *
MATH 157 - Calculus I for the Social Sciences (3) *

and one of

MATH 152 - Calculus II (3)
MATH 155 - Calculus II for the Biological Sciences (3) *
MATH 158 - Calculus II for the Social Sciences (3) *

and one of

MATH 232 - Applied Linear Algebra (3) *

MATH 240 - Algebra I: Linear Algebra (3)

* with a B grade or better

Upper Division Requirements

Students complete a total of 48 units, including all of

MATH 308 - Linear Optimization (3)

MATH 348 - Probabilistic Models in Operations Research (3)

MATH 402W - Operations Research Clinic (4)

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MATH 445 - Graph Theory (3)

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Interdisciplinary Requirement

With advisor approval, students also complete at least 15 units **from application areas**. Application courses are chosen from ACMA, BUEC, BUS, CMPT, ECON, MACM, MATH, REM and STAT courses. Courses used to fulfill upper division requirements cannot be used to fulfill this requirement. If the operations research honours is completed as part of a second bachelor's degree, then the interdisciplinary requirement may be waived if the previous degree contains an approved major. Approvals are given individually. Those majors that are approved will not be limited to the disciplines listed above.

Faculty of Science Honours Requirements

LEAVE

~~In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements by completing additional upper division units to total a minimum of 60 upper division units (excluding EDUC 401 to 406).~~

~~Students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences~~

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Residency Requirements and Transfer Credit

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Elective Courses

In addition to the courses listed above, students should consult an academic advisor to plan the remaining required elective courses.

Rationale:

Changes [Rationale in brackets]

Change 132 units to 120 units:

[Change to (hopefully) increase honours enrollment. Note, the OR honours program requires MATH 402 Operations Research Clinic (4) which is a research project course.]

Delete "Computing science courses that are completed ... ":

[The WQB requirements fulfill and supersede this old faculty requirement.]

Add CMPT 127 - Computing Laboratory (3):

[Computing has made it a formal co-requisite for CMPT 125]

Delete MATH 445-Graph Theory from Table II

[It is redundant; MATH 345 is a prereq of MATH 445]

Add CMPT to the list of application areas:

[The department wishes to add this as an option.]

Tabled Item SCUS 15-12d

(i) Lower division requirement changes to the:

- Applied Physics program
- Applied Physics Honours program
- Biological Physics program
- Biological Physics Honours program
- Chemical Physics program
- Chemical Physics Honours program
- Physics program
- Physics Honours program

The motion was to add chem. 123/124 to join the enriched cohort courses of Physics and Math 125/126 as explained in the rationale.

There appeared to be agreement on this motion. However the question was raised regarding the items that appeared in blue throughout the lower division requirements, and whether they were being added as new courses.

In fact PHYS 132/133 were approved by SCUS last Fall and by the Senate on Feb 6, but were not in the calendar yet when we submitted the recent documents.

The blue coloring was added to indicate already approved changes that had been incorporated. This does not take away from the original motion to add chem. 123/124 to join the enriched cohort courses of Physics and Math 125/126 as explained in the rationale.

We will work to make submissions from Science more succinct and directed.

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MEMO

Jeffrey McGuirk
Associate Professor
Undergraduate Chair
Dept. of Physics

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ATTENTION: Carl Lowenberger

RE: Undergraduate Program changes for the Department of Physics

DATE: March 9, 2015

Motion: To change all Physics major programs to add the choice of CHEM 123 and CHEM 124.

Rationale: The CHEM 123/124 enriched introductory courses will launch in Fall 2015 to join the enriched cohort courses of PHYS and MATH 125/126.

Sincerely,
Jeffrey McGuirk
Undergraduate Chair
Department of Physics

Applied Physics Program Lower Division Requirements

FROM:

Students complete a minimum total of 54 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~
~~CHEM 122 - General Chemistry II (2)~~
 CHEM 126 - General Chemistry Laboratory II (2)
 CMPT 102 - Introduction to Scientific Computer Programming (3)
 CMPT 150 - Introduction to Computer Design (3)
 CMPT 250 - Introduction to Computer Architecture (3)
 MATH 152 - Calculus II (3)
 MATH 251 - Calculus III (3)
 MATH 252 - Vector Calculus (3)
 PHYS 132 - Physics Laboratory I (1) *
 PHYS 133 - Physics Laboratory II (1) *
 PHYS 211 - Intermediate Mechanics (3)
 PHYS 231 - Physics Laboratory II (3)
 PHYS 233 - Physics Laboratory III (2)
 PHYS 255 - Vibrations and Waves (3)
 PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)
 CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)
 CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 150 - Calculus I with Review (4)
 MATH 151 - Calculus I (3)

and one of

MATH 232 - Applied Linear Algebra (3)
 MATH 240 - Algebra I: Linear Algebra (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)
 PHYS 125 - Mechanics and Special Relativity (3) +
 PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)
 PHYS 126 - Electricity, Magnetism and Light (3) +
 PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Applied Physics Honours Program Lower Division Requirements

Students complete a minimum total of 54 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~

~~CHEM 122 - General Chemistry II (2)~~

CHEM 126 - General Chemistry Laboratory II (2)

CMPT 102 - Introduction to Scientific Computer Programming (3)

CMPT 150 - Introduction to Computer Design (3)

CMPT 250 - Introduction to Computer Architecture (3)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

PHYS 132 - Physics Laboratory I (1) *

PHYS 133 - Physics Laboratory II (1) *

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 233 - Physics Laboratory III (2)

PHYS 255 - Vibrations and Waves (3)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3) +

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

An additional second year CMPT course, such as CMPT 212, is recommended.

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133
+ recommended

Biological Physics Program Lower Division Requirements

Students complete a minimum total of 64 units, including all of

BISC 101 - General Biology (4)
 BISC 102 - General Biology (4)
 BISC 202 - Genetics (3)
~~CHEM 121 - General Chemistry and Laboratory I (4)~~
~~CHEM 122 - General Chemistry II (2)~~
 CHEM 281 - Organic Chemistry I (4)
 CHEM 282 - Organic Chemistry II (2)
 MATH 251 - Calculus III (3)
 MATH 252 - Vector Calculus (3)
 MBB 222 - Molecular Biology and Biochemistry (3)
 MBB 231 - Cellular Biology and Biochemistry (3)
 PHYS 211 - Intermediate Mechanics (3)
 PHYS 231 - Physics Laboratory II (3)
 PHYS 255 - Vibrations and Waves (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)
 CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)
 CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)
 MATH 150 - Calculus I with Review (4)
 MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)
 MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)
 MATH 240 - Algebra I: Linear Algebra (3)

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)
 PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

PHYS 101 - Physics for the Life Sciences I (3)
 PHYS 120 - Mechanics and Modern Physics (3)
 PHYS 125 - Mechanics and Special Relativity (3) +
 PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 102 - Physics for the Life Sciences II (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

and either

PHYS 130 - Physics for the Life Sciences Laboratory (2)

or both of

PHYS 132 – Physics Laboratory I (1)

PHYS 133 – Physics Laboratory II (1)

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Biological Physics Honours Program Lower Division Requirements

Students complete a minimum total of 64 units, including all of

BISC 101 - General Biology (4)

BISC 102 - General Biology (4)

BISC 202 - Genetics (3)

~~**CHEM 121 - General Chemistry and Laboratory I (4)**~~

~~**CHEM 122 - General Chemistry II (2)**~~

CHEM 281 - Organic Chemistry I (4)

CHEM 282 - Organic Chemistry II (2)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

MBB 222 - Molecular Biology and Biochemistry (3)

MBB 231 - Cellular Biology and Biochemistry (3)

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 255 - Vibrations and Waves (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

PHYS 101 - Physics for the Life Sciences I (3)

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3) +

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 102 - Physics for the Life Sciences II (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

and either

PHYS 130 - Physics for the Life Sciences Laboratory (2)

or both of

PHYS 132 – Physics Laboratory I (1)

PHYS 133 – Physics Laboratory II (1)

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Chemical Physics Program Lower Division Requirements

Students are strongly encouraged to complete at least three lower division computing science units, in addition to the following requirements.

Students complete a minimum total of 59 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~

~~CHEM 122 - General Chemistry II (2)~~

CHEM 126 - General Chemistry Laboratory II (2)

CHEM 215 - Introduction to Analytical Chemistry (4)

CHEM 230 - Inorganic Chemistry (3)

CHEM 236W - Inorganic Chemistry Laboratory (3)

CHEM 266 - Physical Chemistry Laboratory I (2)

CHEM 281 - Organic Chemistry I (4)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

PHYS 132 - Physics Laboratory I (1) *

PHYS 133 - Physics Laboratory II (1) *

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 255 - Vibrations and Waves (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)
 PHYS 125 - Mechanics and Special Relativity (3) +
 PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)
 PHYS 126 - Electricity, Magnetism and Light (3) +
 PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Chemical Physics Honours Program Lower Division Requirements

Students are strongly encouraged to complete at least three lower division CMPT units, in addition to the following requirements.

Students complete a minimum total of 59 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~

~~CHEM 122 - General Chemistry II (2)~~

CHEM 126 - General Chemistry Laboratory II (2)

CHEM 215 - Introduction to Analytical Chemistry (4)

CHEM 230 - Inorganic Chemistry (3)

CHEM 236W - Inorganic Chemistry Laboratory (3)

CHEM 266 - Physical Chemistry Laboratory I (2)

CHEM 281 - Organic Chemistry I (4)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

PHYS 132 - Physics Laboratory I (1) *

PHYS 133 - Physics Laboratory II (1) *

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 255 - Vibrations and Waves (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

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MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)
PHYS 125 - Mechanics and Special Relativity (3) +
PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)
PHYS 126 - Electricity, Magnetism and Light (3) +
PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Physics Program Lower Division Requirements

Students complete a minimum total of 46 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~

~~CHEM 122 - General Chemistry II (2)~~

CMPT 102 - Introduction to Scientific Computer Programming (3)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

PHYS 132 - Physics Laboratory I (1) *

PHYS 133 - Physics Laboratory II (1) *

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 233 - Physics Laboratory III (2)

PHYS 255 - Vibrations and Waves (3)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3) +

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended

Physics Honours Program Lower Division Requirements

Students complete a minimum total of 46 units, including all of

~~CHEM 121 - General Chemistry and Laboratory I (4)~~

~~CHEM 122 - General Chemistry II (2)~~

CMPT 102 - Introduction to Scientific Computer Programming (3)

MATH 251 - Calculus III (3)

MATH 252 - Vector Calculus (3)

PHYS 132 - Physics Laboratory I (1) *

PHYS 133 - Physics Laboratory II (1) *

PHYS 211 - Intermediate Mechanics (3)

PHYS 231 - Physics Laboratory II (3)

PHYS 233 - Physics Laboratory III (2)

PHYS 255 - Vibrations and Waves (3)

PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 123 - Enriched Chemistry I and Laboratory (4)

and one of

CHEM 122 - General Chemistry II (2)

CHEM 124 - Enriched Chemistry II (3)

and one of

MATH 125 - Math methods for Phys.Sci.-I (3)

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

and one of

MATH 126 - Math methods for Phys.Sci.-II (3)

MATH 152 - Calculus II (4)

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3) +

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) *

and one of

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) *

* students with credit for PHYS 140 and 141 are not required to complete PHYS 132 or 133

+ recommended