

**SCIENCE FACULTY COUNCIL
AGENDA**
Friday, May 30, 2025 - 1:00 PM - D213

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- 1. WELCOME**
- 2. AGENDA and MINUTES**
 - 2.1. Adoption of Agenda**

MOTION: that Faculty Council approve the agenda as presented
 - 3 - 4 **2.2. Approval of the Minutes - April 4, 2025**

MOTION: that Faculty Council approve the minutes as presented.
- 3. GUESTS**

None
- 4. FOR DECISION**
 - 5 - 10 **4.1. PHYS 118 New Course**
 - 11 - 14 **4.2. PHYS 499 New Course**
 - 15 - 19 **4.3. PHYSICS Minor Program Changes**
 - 20 - 24 **4.4. PHYSICS Major Program Changes**
 - 25 - 32 **4.5. PHYSICS Honours Program Changes**
 - 33 - 38 **4.6. GEOG 260 and PLAN 260 Crosslisted**
 - 39 - 44 **4.7. MATH / ENGR 152 Course Changes**
 - 45 - 49 **4.8. MATH 415 Course Changes**
 - 50 - 53 **4.9. MATH 416 Course Changes**
 - 54 - 59 **4.10. AGRI 292 Course Changes**
 - 60 - 73 **4.11. BAS Program Changes**
 - 74 - 80 **4.12. PHYS 281 New Course**
- 5. FOR DISCUSSION**
 - 5.1. Divisional Review Committee (DRC)**
- 6. INFORMATION ITEMS**

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6.1 Monthly reports to the Provost from the Faculty of Science can be found below. If you have news to share, please email Alison so it can be included on our next report.

<https://ufv.ca/science/deans-office/monthly-department-highlights/>

6.2 Rhodes Scholarships

81 - 82

6.2.1.

7. REPORTS

Dean's Report

Advising

BSc

Indigenization

EDI

Senate

Student Report

8. ACHIEVEMENT AWARDS

8.1. Awesome Achievement Award

8.2. Terrific Teaching Award

8.3. Outstanding Outreach Award

8.4. Remarkable Research Award

8.5. Superb Service - Faculty

8.6. Superb Service - Staff

8.7. Perfect Attendance

9. ADJOURN

Next Meeting: September 5, 2025 @ TBD

Quorum - 14 voting members



**SCIENCE FACULTY COUNCIL
MINUTES - DRAFT**
Friday, April 4, 2025 - 1:15 PM - D121

Chair
Ian Affleck

In Person
Almaz Butaev, Robin Endelman, Cynthia Loten, Mariano Mapili, Vanessa Radzimski, Afia Raja, Jake Spooner, Kristen Switzer, Ben Vanderlei, Natallia Varankovich, Debbie Wheeler

Virtual
Alastair Hodges (Guest), Gillian Mimmack, Jennifer Barrett, Sandra Gillespie, Alida Jamnaat, Anna Kuczynska, Carolyn Atkins, Frank Zhang, David Chu, Yvonne Dzal, Sebastian Molina, Sharon Gillies, Nathan Bialas, Mitra Tabatabaee, Marina Turlakis, Justin Lee, Kseniya Garaschuk, Jason Thomas, Stefania Pizzirani

Recorder
Alison Reeves

1. WELCOME

2. AGENDA and MINUTES

2.1. Adoption of Agenda

MOTION: that the Faculty Council approve the agenda as presented

Approved with addition of 5.3.
1st Robin Endelman, 2nd Almaz Butaev, Carried.

2.2. Approval of Minutes - March 7, 2025

MOTION: that the Faculty Council approve the minutes of March 7, 2025, meeting as presented

1st Ben Vanderlei, 2nd Cindy Loten. Carried.

3. GUESTS

3.1. Alastair Hodges - University-Wide Principles for the Establishment and Review of Standards for Tenure and Promotion Draft – Consultation

4. FOR DECISION
None

5. FOR DISCUSSION

5.1. Bachelor of Science Entrance Requirements – Ben

Review and discussion of current math requirements, entrance requirements and course requirements. The department is working on entrance and course requirement updates and is seeking feedback from larger faculty.

5.2. Science Fair Judges Needed - Jacob

We need Science Fair Judges - April 10, 2025. If you are able to attend the Fair from 1 - 5 pm and be a judge please let Jacob know or register directly @ <https://www.eventbrite.ca/e/1272731126059?aff=oddtcreator>

5.3. Science Rock Summer Cap – Faculty Supervisors

6. INFORMATION ITEMS

6.1 Monthly reports to the Provost from the Faculty of Science can be found below. If you have news to share, please email Alison so it can be included in our next report.

<https://ufv.ca/science/deans-office/monthly-department-highlights/>

7. REPORTS

Dean's Report (Michael) - No Report

Advising (Kristen) – No Report

BSc Report (Stan) – No Report

Indigenization – No Report

EDI - Pilot Course Information (see 7.1)

Senate (Nathan or Pedro)

Program Changes & Budget Reviews

Student Report (Hardil or Sebastian) – No Report

7.1. EDI In Organizations

8. ADJOURN

Next Meeting: May 2 @ 1:15 PM in D119

Quorum - 14 voting members

Memo for New Course

To: Science Faculty Council, UEC

From: Jeff Chizma, Physics department Head

Date: April 11, 2025

Subject: Proposal for new course PHYS 118: Waves, Optics, and Electromagnetism

1. Rationale for new course, including how this course fits into the program(s):

In an attempt to reduce the number of required courses for the Engineering Transfer students, as well as to better conform to similar courses at other institutions, we have decided to replace our current PHYS 112 (required for the Physics minor, major and honours programs) with this new PHYS 118 as our second semester Physics course. Specifically, we have added content dealing with waves, optics, and quantum physics, while reducing some of the content currently covered in PHYS 112. This new course should appeal to more students (more breadth of topics), and as the overall content is less mathematically demanding, we expect to see more students successfully completing the course and potentially taking additional Physics courses. As PHYS 118 is better aligned with the content covered in similar courses at other institutions, it should also articulate better than our previous PHYS 112.

2. Explain how the course learning outcomes align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

Students taking this course will be required to critically examine a variety of physics problems, identify the most important aspects of the problem, apply their knowledge of the appropriate laws of physics, and effectively communicate their solution to the instructor via assignment or tests.

Course Learning Outcome	Alignment with ILO
Analyze problems in both acoustics and optics using the properties of waves	1,2,3
Apply the laws of reflection and refraction to optical systems consisting of lenses and mirrors.	1,2,3
Demonstrate their understanding of the electric field and electric potential by solving problems in electrostatics	1,2,3
State how magnetic fields are created and determine how charged particles interact with these fields	1,2,3
Solve problems in quantum theory using the Planck and de Broglie hypotheses	1,2,3

3. Will this course be required by any program beyond the discipline? If so, how will this course affect that program or programs?

Currently PHYS 112 is required for Chemistry major and honours programs, but is optional in Biology and both the B.Sc. and A.Sc. As PHYS 118 is replacing PHYS 112, we expect that PHYS 118 may be required by the aforementioned programs. As the new content in PHYS 118 covers a larger breadth of topics while still maintaining much of the core subject area (electromagnetism), we do not expect any adverse repercussions on these other programs.

4. Which program areas have been consulted about the course?

The departments of Biology and Chemistry have been consulted..

5. If a new discipline designation is required, explain why:

N/A

6. In what ways does this course contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

The topics outlined in the course—such as waves, optics, electromagnetism, and quantum theory—are primarily rooted in scientific traditions. However, these topics can still contribute to the indigenization of academia in meaningful ways.

Specific examples that correlate the scientific concepts with Indigenous practices will be used in this course. For example, drum circles' collective sound can be studied as a form of interference, where multiple sound waves combine to create complex acoustic patterns. The rhythmic speech or chants used in oral traditions involves the modulation of sound waves and can be linked to the study of wave frequency, pitch, and resonance. In the study of optics, examples can be drawn from the ways in which Indigenous peoples have used natural materials—such as crystals, water, and reflective surfaces—to optimize their interaction with light, seen in art, tools, and architectural designs. When discussing quantum theory, a parallel can be made between wave-particle duality or the uncertainty principle and the Indigenous understanding of the universe as being fluid and ever-changing, where everything is interconnected and in constant motion.

Storytelling will be integrated as a pedagogical tool to introduce new topics, allowing students to make connections between cultural knowledge and scientific principles. Additionally, hands-on learning in the lab will be emphasized, with experiments designed to promote discovery-based learning—reinforcing the idea that knowledge is built through experience and exploration. Group work will also be encouraged in preparation for quizzes and exams, fostering a community-based approach to learning that mirrors Indigenous values of collective knowledge-sharing and collaboration.

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?

This physics course promotes equity, diversity, and inclusion by ensuring all students have equal access to the material and feel valued. The course design and teaching methods are gender agnostic, making the content accessible to everyone, and students are encouraged to share their perspectives respectfully. Assignments are varied, including group-oriented labs and individual work which accommodate different learning styles. Topics include contributions from diverse cultures to scientific principles ensuring the material is relevant to all. The course uses OER resources and tailor-made problems to ensure content is inclusive, and collaborative learning helps students engage with each other's perspectives. In addition, the use of OER materials may reduce financial burdens on students by not requiring them to purchase expensive textbooks. Instructors create a safe environment, where respect and inclusivity are prioritized. By using Universal Design for Learning (UDL) principles and emphasizing the contributions of underrepresented groups, the course ensures every student has the opportunity to succeed in a supportive, inclusive setting.

8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc.):

N/A

9. Estimate of the typical costs for this course, including textbooks and other materials:

By moving to OER, the only additional cost to students would be for a scientific calculator. A decent calculator can be found for under \$30, but most students will already have the one that they used in high school.



ORIGINAL COURSE IMPLEMENTATION DATE:
 REVISED COURSE IMPLEMENTATION DATE:
 COURSE TO BE REVIEWED (six years after UEC approval):
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PHYS 118		Number of Credits: 5 Course credit policy (105)													
Course Full Title: Waves, Optics, and Electromagnetism															
Course Short Title: (To be assigned by OReg based on university standards.)															
Faculty: Faculty of Applied and Technical Studies		Department/School: Physics													
Calendar Description: As a follow-up to PHYS 111, this calculus-based Physics course is for students who are planning to continue their studies in physics or any of the other sciences. Topics covered include: waves, optics, electric fields, circuits, magnetic fields, and some quantum theory. The laboratory portion of the course uses experiments to reinforce the theory covered in class. Note: Students with credit for PHYS 112 cannot take this course for further credit.															
Prerequisites (or NONE):		PHYS 111													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):		MATH 111; (MATH 112 or 118 strongly recommended)													
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: PHYS 112 Cross-listed with: Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>		Course Details Special Topics course: No <i>(If yes, the course will be offered under different letter designations representing different topics.)</i> Directed Study course: No <i>(See policy 207 for more information.)</i> Grading System: Letter grades Delivery Mode: May be offered in multiple delivery modes Expected frequency: Annually Maximum enrolment (for information only): 36													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>75</td> </tr> <tr> <td>Supervised laboratory hours (science lab)</td> <td>45</td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>Total hours</td> <td>120</td> </tr> </table>		Lecture/seminar	75	Supervised laboratory hours (science lab)	45	[click to select]		[click to select]		[click to select]		Total hours	120	Prior Learning Assessment and Recognition (PLAR) PLAR is available for this course.	
Lecture/seminar	75														
Supervised laboratory hours (science lab)	45														
[click to select]															
[click to select]															
[click to select]															
Total hours	120														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: Yes		Transfer Credit (<i>See bctransferguide.ca.</i>) Transfer credit already exists: No Submit outline for (re)articulation: Yes <i>(If yes, fill in transfer credit form.)</i>													
Department approval		Date of meeting:													
Faculty Council approval		Date of meeting:													
Undergraduate Education Committee (UEC) approval		Date of meeting:													

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

Upon successful completion of this course, students will be able to:

1. Analyze problems in both acoustics and optics using the properties of waves.
2. Apply the laws of reflection and refraction to optical systems consisting of lenses and mirrors.
3. Demonstrate their understanding of the electric field and electric potential by solving problems in electrostatics.
4. State how magnetic fields are created and determine how charged particles interact with these fields.
5. Solve problems in quantum theory using the Planck and de Broglie hypotheses.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Assignments:	10%	Quizzes/tests/midterm:	30%	[click to select]	%
Lab work:	20%	Final exam:	40%	[click to select]	%

Details:

(Provide a full assessment breakdown and any other relevant information.)

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Typical lecture instruction methods consist of a combination of white/chalk board calculations along with some pre-prepared lecture slides. Laboratory work will involve performing a number of experiments throughout the semester.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)*

Type	Author or description	Title and publication/access details	Year
1. OER	Open Stax	University Physics Vol 1-3	-
2. Textbook	Young and Freedman	University Physics 15 th Edition	2019
3. [click to select]			
4. [click to select]			
5. [click to select]			

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Scientific calculator.

Course Content and Topics

1. Waves: frequency, wavelength, and amplitude; the wave equation and its solutions; travelling and standing waves; transverse and longitudinal waves; acoustic waves and sound; intensity and level intensity; Doppler effect; superposition and interference.
2. Optics: laws of reflection and refraction; index of refraction; dispersion and prisms; thin lens equation; systems of lenses and mirrors; telescopes and microscopes; double slit interference and single slit diffraction; diffraction gratings.
3. Electromagnetism: Coulombs law; the electric field; the electric potential; Gauss's law; capacitors and resistors; circuits and Kirchhoff's laws; magnetic fields; Lorentz force law.
4. Quantum Theory: Planck's hypothesis and the quantization of light; matter waves and the de Broglie hypothesis; the wave—particle duality; particle in a box and energy quantization; the hydrogen atom and its energy levels; simple spectroscopy and the chemical elements; the time dependent Schrodinger equation.

UFV Transfer Credit Request Form

Course: PHYS 118 – Waves, Optics, and Electromagnetism

Code	Full Institution name	Transfer credit exists	Request transfer credit
ALEX	Alexander College	☐	☒
ASM	Acsenda School of Management	☐	☐
AU	Athabasca University	☐	☒
BCIT	BC Institute of Technology	☐	☒
CAMO	Camosun College	☐	☒
CAPU	Capilano University	☐	☒
CCC	Corpus Christi College	☐	☐
CMTN	Coast Mountain College	☐	☒
CNC	College of New Caledonia	☐	☒
COTR	College of the Rockies	☐	☒
COLU	Columbia College	☐	☒
COQU	Coquitlam College	☐	☐
DOUG	Douglas College	☐	☒
EC	Emily Carr University of Art & Design	☐	☐
FDU	Fairleigh Dickinson University	☐	☐
FIC	Fraser International College	☐	☐
JIBC	Justice Institute of BC	☐	☐
KPU	Kwantlen Polytechnic University	☐	☒
LANG	Langara College	☐	☒
LCV	LaSalle College Vancouver	☐	☐
NVIT	Nicola Valley Institute of Technology	☐	☐
NIC	North Island College	☐	☒
NLC	Northern Lights College	☐	☒
OC	Okanagan College	☐	☒
QU	Quest University	☐	☐
SELK	Selkirk College	☐	☒
SFU	Simon Fraser University	☐	☒
TRU	Thompson Rivers University	☐	☒
TWU	Trinity Western University	☐	☒
UBCO	University of British Columbia – Okanagan	☐	☒
UBCV	University of British Columbia – Vancouver	☐	☒
UCW	University Canada West	☐	☐
UNBC	University of Northern BC	☐	☒
UVIC	University of Victoria	☐	☒
VCC	Vancouver Community College	☐	☒
VIU	Vancouver Island University	☐	☒
YVU	Yorkville University	☐	☐

Visit <https://tcs.bctransferguide.ca/Web/Help/Detail/Upper-Level-Credit-Policy> for a list of institutions that will articulate upper-level courses.

For help identifying appropriate receiving institutions, see www.bccat.ca/pubs/resources/HowToArticulate2018.pdf.

Memo for New Course

To: Science Faculty Council, UEC

From: Jeff Chizma, Physics department Head

Date: April 11, 2025

Subject: Proposal for new course: PHYS 499 - Physics Honours Module

1. Rationale for new course, including how this course fits into the program(s):

As part of the process in updating the Physics honours program, we are adding in a research-based course which is consistent with other honours programs across UFV as well as at other institutions. As the honours program is expected to be taken by students interested in pursuing their study of Physics in graduate school, this course will help them prepare for the amount of independent study required by such programs. Only students enrolled in the Physics honours program will be able to take this course, and it will run in conjunction with a separate PHYS host course approved by the Physics department. For example, the student may take PHYS 499 in conjunction with say PHYS 457 (Particle Physics), where they would be required to learn additional material not covered in PHYS 457. Students would then be expected to write a report summarizing the material that they learned, and then give a presentation to an audience of their peers.

2. Explain how the course learning outcomes align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

Students taking this course will be required to independently study more advanced topics not covered in the host course. Final reports and presentations by the student will be expected, and will contribute to addressing a variety of ILO's.

Course Learning Outcome	Alignment with ILO
Work independently under the supervision of a subject matter expert to learn advanced topics related to the material in the host course	1, 2, 8
Apply the knowledge and techniques learned in the host course to investigate the more complex aspects of the subject	1, 2, 3
Use LaTeX to prepare a clear and concise scientific report on a selected subset of the advanced topics studied	1, 3
Deliver a brief research presentation based on their submitted report to an audience of their peers	3
Understand the work expectations required of them in graduate school or in other post-graduation careers	6, 8

3. Will this course be required by any program beyond the discipline? If so, how will this course affect that program or programs?

No, this course will only be taken by students in the Physics honours program.

4. Which program areas have been consulted about the course?

As this course is specific to the Physics honours program, no other areas have been consulted.

5. If a new discipline designation is required, explain why:

N/A

6. In what ways does this course contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

A student led, research-based course aligns with the principles of Indigenous knowledge and values, particularly the concept of reciprocity. In this framework, students engage in research and learning that emphasizes mutual respect, shared knowledge, and giving back to the community by presenting their learning to the community. Indigenous perspectives prioritize interconnectedness and holistic understanding, values that are reflected in a collaborative, student driven approach. By centering student agency, the course honors Indigenous ways of knowing, where learning is a two-way exchange. Students not only gain knowledge but also contribute meaningfully to the collective, fostering a cycle of respect, responsibility, and cultural sustainability within the academic setting.

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?

This course empowers students from diverse backgrounds to take ownership of their learning. It encourages a collaborative environment where varying perspectives are valued. The research process allows students to explore topics that resonate with their unique experiences, helping to bridge gaps in representation. Furthermore, by involving students in shaping the course, it creates opportunities for equitable participation, ensuring that voices traditionally marginalized in academic settings are heard and respected. This approach nurtures an inclusive atmosphere where all students can contribute to and learn from each other's ideas and experiences.

8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc.):

N/A

9. Estimate of the typical costs for this course, including textbooks and other materials:

There will be no cost beyond what would be required in the host course.



ORIGINAL COURSE IMPLEMENTATION DATE:
 REVISED COURSE IMPLEMENTATION DATE:
 COURSE TO BE REVIEWED (six years after UEC approval):
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PHYS 499		Number of Credits: 1 Course credit policy (105)													
Course Full Title: Physics Honours Module															
Course Short Title: (To be assigned by OReg based on university standards.)															
Faculty: Faculty of Applied and Technical Studies		Department/School: Physics													
Calendar Description: Specific to the Physics honours program, this course is to be taken in conjunction with an existing upper-level physics course approved by the Physics department. Students will be required to cover additional topics to supplement the approved course content, culminating in a final report and presentation. Note: Students with credit for _____ cannot take this course for further credit.															
Prerequisites (or NONE):		Admission to the Physics honours program													
Corequisites (if applicable, or NONE):		An upper-level PHYS course approved by the Physics department													
Pre/corequisites (if applicable, or NONE):															
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>		Course Details Special Topics course: No <i>(If yes, the course will be offered under different letter designations representing different topics.)</i> Directed Study course: Yes; cannot be repeated for credit <i>(See policy 207 for more information.)</i> Grading System: Letter grades Delivery Mode: May be offered in multiple delivery modes Expected frequency: Annually Maximum enrolment (for information only): 6													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Supervised directed learning (directed studies only)</td> <td>25</td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>Total hours</td> <td>25</td> </tr> </table>		Supervised directed learning (directed studies only)	25	[click to select]		[click to select]		[click to select]		[click to select]		Total hours	25	Prior Learning Assessment and Recognition (PLAR) PLAR cannot be awarded for this course because: This course is to be taken alongside an existing UFV Physics course as part of the honours degree.	
Supervised directed learning (directed studies only)	25														
[click to select]															
[click to select]															
[click to select]															
[click to select]															
Total hours	25														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: [click to select]		Transfer Credit (<i>See bctransferguide.ca.</i>) Transfer credit already exists: No Submit outline for (re)articulation: No <i>(If yes, fill in transfer credit form.)</i>													
Department approval		Date of meeting:													
Faculty Council approval		Date of meeting:													
Undergraduate Education Committee (UEC) approval		Date of meeting:													

Learning Outcomes

As this course will supplement an existing Physics course, the additional learning outcomes beyond those of the associated course will be:

Upon successful completion of this course, students will be able to:

1. Work independently under the supervision of a subject matter expert to learn advanced topics related to the material in the host course
2. Apply the knowledge and techniques learned in the host course to investigate the more complex aspects of the subject
3. Use LaTeX to prepare a clear and concise scientific report on a selected subset of the advanced topics studied
4. Deliver a brief research presentation based on their submitted report to an audience of their peers
5. Understand the work expectations that may be required of them in graduate school or other post-graduation careers

Recommended Evaluation Methods and Weighting (*Evaluation should align to learning outcomes.*)

Assignments:	30%	Project:	20%	[click to select]	%
Project:	50%	[click to select]	%	[click to select]	%

Details:

Students will be required to do additional assignment questions beyond what is expected in the host course. In addition, students will be required to write a final paper worth 50% of their grade, as well prepare and deliver an oral presentation (20%) to their peers.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (*Guest lecturers, presentations, online instruction, field trips, etc.*)

A combination of face to face lectures (for the host course) and independent study for the additional course material.

Texts and Resource Materials (*Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)*)

Type	Author or description	Title and publication/access details	Year
1. Textbook	Textbook used will depend on the course being supplemented.		
2. [click to select]			
3. [click to select]			
4. [click to select]			
5. [click to select]			

Required Additional Supplies and Materials (*Software, hardware, tools, specialized clothing, etc.*)

Course Content and Topics

Course content will vary depending on the course being supplemented.

Memo for Program Changes

To: *Science Faculty Council, UEC*

From: *Jeff Chizma, Physics department Head*

Date: *April 3, 2025*

Subject: Program change - Bachelor of Science – Physics Minor

1. Summary of changes (select all the apply):

- ☐ Program revision that requires new resources
- ☒ Addition of new course options or deletion or substitution of a required course
- ☐ Change to the majority of courses in an approved program
- ☐ Change to the duration, philosophy, or direction of a program
- ☐ Addition of a new field of specialization, such as a concentration
- ☐ Change in requirements for admission
- ☐ Change in requirements for residency or continuance
- ☐ Change in admission quotas
- ☐ Change which triggers an external review
- ☐ Deletion of a program not included in the Program Discontinuance policy
- ☒ Other – Please specify:

We are updating the number of listed course requirements to better reflect what is expected for students with a minor in Physics, and to help ensure that all course prerequisites are met.

2. Rationale for change(s):

In the past couple of years we have had some difficulty placing our students into graduate programs with our Physics major, and as a result we were compelled to make some changes to our programs (the major and honours in particular) to help ensure the success of our students after graduation. These changes also necessitated updating some of our course offerings, which affected all of our programs. The changes to the minor consist of updating the list of offered courses (including the new PHYS 118), as well as some tightening of the requirements by adding in specific courses needed for the minor. This will help keep students on track in terms of ensuring that they are taking the necessary prerequisite courses needed in order to complete the minor. The changes will also better align the Physics minor with other minors offered at UFV, and are now more consistent with Physics minors offered at other institutions.

3. If program outcomes are new or substantially changed, explain how they align with the Institutional Learning Outcomes:

The program outcomes have not changed.

4. What consideration has been given to Indigenizing the curriculum?

Indigenous pedagogies will be integrated to enhance learning. Storytelling will be used to introduce new concepts, making abstract ideas more relatable and meaningful. Collaborative group projects will encourage students to learn from one another, reflecting the communal nature of Indigenous knowledge-sharing. Hands-on learning in labs will be emphasized, with experiments designed to promote discovery-based learning, reinforcing the idea that knowledge is built through experience and exploration. The deep connection between physics and the world around us will be emphasized and examples anchored in Indigenous experience will be used when possible. By incorporating these approaches, students will engage more deeply with scientific concepts in a way that is both inclusive and impactful.

5. Will additional resources be required? If so, how will these costs be covered?

No additional resources will be required.

6. How will students be impacted? (Indicate the projected number of students impacted.) Is the change expected to increase/decrease enrolment in the program?

On average we have only around 2 students per year who earn a minor in Physics, where the changes we are proposing would not have any impact on the courses those students generally take. We are in effect codifying the courses that all minor students need to take in order to successfully earn the credential.

7. Does the number of required core or elective credits from the program-specific discipline change? If so, will this change the total number of courses to be offered within the discipline?

Yes, the number of required courses has increased from zero listed courses to in effect 7 listed courses (one of which has three options). These (now) required courses were all courses students needed to take in order to earn the minor (based on pre and corequisites required for upper-level courses), so this new listing will make it easier for students to plan their semesters. These changes will not affect the overall number of courses offered in Physics.

8. Identify any available resources that will be used to accommodate the program changes. (Eg. seats in existing classes, conversion of sections, timetabling changes, deletion of courses, etc.)

No additional resources will be required in order to implement these changes.

9. Is the number of required or elective courses from other disciplines in the program changing? If so, what is the estimated impact to enrolments in these courses?

Yes. Although we are now requiring MATH 211 as part of the minor, this course was effectively always required in the past in order to earn the minor. That is, MATH 211 is a required co-requisite for PHYS 221 and a pre-requisite for PHYS 381 – both of which are required in order to take most upper-level Physics courses. We therefore do not anticipate there being an impact on the overall number of students taking MATH 211 as a result of the proposed changes.

10. Provide a memo from the program's dean to confirm that budgetary implications of the proposed changes have been considered and will be addressed within the faculty budget.

See attached note from the Dean of ATS.

Physics minor

This section specifies the Physics minor requirements only. Please refer to the [Bachelor of Science](#) section for information on additional requirements. Students need to combine these physics minor requirements with the credits from another science minor, major, or honours if they wish to obtain a Bachelor of Science degree.

Note: Students must be aware that upper-level physics courses require lower-level physics and math prerequisites. Students are advised to take these lower-level prerequisites in their first two years of full-time study.

Declaration requirements

Students admitted to the [Bachelor of Science](#) may formally declare a science major or minor if they have a minimum CGPA of 2.00 and meet the declaration requirements for the subject discipline. BSc students are expected to declare a major or minor by the time they have completed 60 credits. Students in other degree programs may declare a science major or minor if they satisfy the declaration requirements and have the approval of their program.

Bachelor of Science students wishing to declare a Physics minor must complete the following prior to their formal declaration:

- PHYS 112 ~~or~~ **PHYS 118**
- One of MATH 112 or MATH 118, with a ~~minumum~~minimum grade of C

Program outline

~~Recommended~~Lower-level requirements courses

Course	Title	Credits
PHYS 111	Mechanics	5
PHYS 112	Electricity and Magnetism	5
or PHYS 118	Waves, Optics, and Electromagnetism	
PHYS 221	Intermediate Mechanics	4
PHYS 225	Waves and Introductory Optics	3
PHYS 231	Thermodynamics	3
PHYS 232	Experimental Methods in Physics	3
MATH 111	Calculus I	4
MATH 112	Calculus II	4
or MATH 118	Calculus II for Life Sciences	
MATH 211	Calculus III	3

One of:

<u>PHYS 231</u>	<u>Thermodynamics</u>	<u>3</u>
<u>PHYS 232</u>	<u>Experimental Methods in Physics</u>	<u>3</u>
<u>PHYS 281</u>	<u>Theoretical Methods in Physics</u>	<u>3</u>

Note: Students interested in taking certain upper-level PHYS courses may require specific second year PHYS courses as prerequisites.

Upper-level requirements

Course	Title	Credits
	14 credits of upper-level PHYS or ENPH	14

Note: Students must complete a minimum of nine upper-level physics (PHYS or ENPH) credits at UFV.



DATE: April 3, 2025
TO: UEC, Faculty of Science
CC: Dr. Jeff Chizma, Department Head, Physics & Engineering
FROM: Dr. Teresa Kisilevich, Dean, Faculty of Applied and Technical Studies
RE: Program change – Bachelor of Science, Physics Minor

I have reviewed the proposed changes to the Physics Minor, with particular care to the scheduling and budgetary implications should these changes be implemented. I am confident that any budgetary implications can be managed within the current faculty budget.

Memo for Program Changes

To: *Science Faculty Council, UEC*

From: *Jeff Chizma, Physics department Head*

Date: *April 3, 2025*

Subject: Program change – Bachelor of Science, Physics Major

1. Summary of changes (select all the apply):

- ☐ Program revision that requires new resources
- ☒ Addition of new course options or deletion or substitution of a required course
- ☐ Change to the majority of courses in an approved program
- ☐ Change to the duration, philosophy, or direction of a program
- ☐ Addition of a new field of specialization, such as a concentration
- ☐ Change in requirements for admission
- ☐ Change in requirements for residency or continuance
- ☐ Change in admission quotas
- ☐ Change which triggers an external review
- ☐ Deletion of a program not included in the Program Discontinuance policy
- ☒ Other – Please specify:

We are increasing the number of specific required courses to better prepare students for post graduation careers, and to provide better guidance to students in terms of courses to take.

2. Rationale for change(s):

In the past couple of years we have had some difficulty placing our students into graduate programs with our Physics major, and as a result we were compelled to make some changes to our programs (the major and honours in particular) to help ensure the success of our students after graduation. The changes to the major consist of updating the required lower-level courses to include 2 additional second year courses, listing the new PHYS 118 as a requirement (PHYS 118 will replace PHYS 112) and adding in another option for the Computing requirement. We also added in 4 specific upper-level course requirements to better reflect the skills expected for students graduating with a Physics major. These changes are also now better aligned with Physics major degrees offered at other institutions.

3. If program outcomes are new or substantially changed, explain how they align with the Institutional Learning Outcomes:

The program outcomes have not changed.

4. What consideration has been given to Indigenizing the curriculum?

Indigenous pedagogies will be integrated to enhance learning. Storytelling will be used to introduce new concepts, making abstract ideas more relatable and meaningful. Collaborative group projects

will encourage students to learn from one another, reflecting the communal nature of Indigenous knowledge-sharing. Hands-on learning in labs will be emphasized, with experiments designed to promote discovery-based learning, reinforcing the idea that knowledge is built through experience and exploration. The deep connection between physics and the world around us will be emphasized and examples anchored in Indigenous experience will be used when possible. By incorporating these approaches, students will engage more deeply with scientific concepts in a way that is both inclusive and impactful.

5. Will additional resources be required? If so, how will these costs be covered?

No additional resources will be required.

6. How will students be impacted? (Indicate the projected number of students impacted.) Is the change expected to increase/decrease enrolment in the program?

In general, the impact on students will be minimal to non-existent. That is, the newly required courses are ones that almost all students already take but having them listed in our actual program will make it clear that students now require them for graduation. This is of particular importance for students applying to graduate school, where it is now more transparent as to what courses students will have had to take. Overall, we do not expect these changes to impact our enrolments in any meaningful way, but they should increase student success after graduation.

7. Does the number of required core or elective credits from the program-specific discipline change? If so, will this change the total number of courses to be offered within the discipline?

Yes, we have added in 2 more lower-level course requirements (PHYS 232 and PHYS 281), as well as 4 new upper-level requirements (PHYS 311, PHYS 312, PHYS 351, and PHYS 352). This will not affect the total number of courses that we offer.

8. Identify any available resources that will be used to accommodate the program changes. (Eg. seats in existing classes, conversion of sections, timetabling changes, deletion of courses, etc.)

No additional resources will be required in order to implement these changes.

9. Is the number of required or elective courses from other disciplines in the program changing? If so, what is the estimated impact to enrolments in these courses? Provide a memo from the respective dean(s) of the impacted faculty to confirm if budgetary implications have been considered and addressed.

No, all new course requirements come from Physics, so no other discipline will be affected.

10. Provide a memo from the program's dean to confirm that budgetary implications of the proposed changes have been considered and will be addressed within the faculty budget.

See attached note from the ATS Dean.

Physics major

This section specifies the Physics major discipline requirements only. Please refer to the [Bachelor of Science](#) section for information on additional requirements.

Declaration requirements

Students admitted to the [Bachelor of Science](#) may formally declare a science major or minor if they have a minimum CGPA of 2.00 and meet the declaration requirements for the subject discipline. BSc students are expected to declare a major or minor by the time they have completed 60 credits. Students in other degree programs may declare a science major or minor if they satisfy the declaration requirements and have the approval of their program.

Bachelor of Science students wishing to declare a Physics major must complete the following prior to their formal declaration:

- PHYS 112 or [PHYS 118](#)
- One of MATH 112 or MATH 118, with a ~~minumum~~minimum grade of C

Program outline

Lower-level requirements

Course	Title	Credits
PHYS 111	Mechanics	5
or PHYS 101 with a B+ or better	Introductory General Physics: Mechanics and Fluids	-
PHYS 112	Electricity and Magnetism	5
<u>or PHYS 118</u>	<u>Waves, Optics, and Electromagnetism</u>	
PHYS 221	Intermediate Mechanics	4
PHYS 231	Thermodynamics	3
<u>PHYS 232</u>	<u>Experimental Methods in Physics</u>	<u>3</u>
<u>PHYS 281</u>	<u>Theoretical Methods in Physics</u>	<u>3</u>
MATH 111	Calculus I	4
MATH 112	Calculus II	4
or MATH 118	Calculus II for Life Sciences	
MATH 211	Calculus III	3
One of:		3–4
COMP 120	Computing for the Sciences	
COMP 150	Introduction to Programming	

COMP 152 Introduction to Structured Programming
ENGR 153 Structured Programming for Engineers

~~Note: While not degree requirements, PHYS 225 and PHYS 232 are recommended as they are prerequisites for several upper-level courses. Other recommended lower-level courses can be found in the Physics Honours section.~~

Upper-level requirements

Course	Title	Credits
<u>PHYS 311</u>	<u>Statistical Physics</u>	<u>3</u>
<u>PHYS 312</u>	<u>Intermediate Electromagnetism</u>	<u>3</u>
<u>PHYS 351</u>	<u>Quantum Mechanics</u>	<u>3</u>
<u>PHYS 352</u>	<u>Special Relativity and Classical Fields</u>	<u>3</u>
PHYS 381/ MATH 381/ ENGR 257	Mathematical Physics	3
Plus either:	<u>27-15</u> credits of upper-level PHYS or ENPH	<u>27-15</u>
or	<u>24-9</u> credits of upper-level PHYS or ENPH and a major <u>or honours</u> in one of the following: Biology, Biochemistry, Chemistry, Computing Science, Mathematics, or Physical Geography	<u>24-9</u>

Note: Students must complete a minimum of 15 upper-level physics (PHYS or ENPH) credits at UFV.



DATE: April 3, 2025
TO: UEC, Faculty of Science
CC: Dr. Jeff Chizma, Department Head, Physics & Engineering
FROM: Dr. Teresa Kisilevich, Dean, Faculty of Applied and Technical Studies
RE: Program change – Bachelor of Science, Physics Major

I have reviewed the proposed changes to the Physics Major, with particular care to the scheduling and budgetary implications should these changes be implemented. I am confident that any budgetary implications can be managed within the current faculty budget.

Memo for Program Changes

To: *Science Faculty Council, UEC*

From: *Jeff Chizma, Physics department Head*

Date: *April 3, 2025*

Subject: Program change - Bachelor of Science, Physics Honours

1. Summary of changes (select all the apply):

- ☐ Program revision that requires new resources
- ☒ Addition of new course options or deletion or substitution of a required course
- ☒ Change to the majority of courses in an approved program
- ☒ Change to the duration, philosophy, or direction of a program
- ☐ Addition of a new field of specialization, such as a concentration
- ☒ Change in requirements for admission
- ☐ Change in requirements for residency or continuance
- ☐ Change in admission quotas
- ☐ Change which triggers an external review
- ☐ Deletion of a program not included in the Program Discontinuance policy
- ☐ Other – Please specify:

2. Rationale for change(s): *In the past couple of years we have had some difficulty placing our students into graduate programs with our Physics major, and as a result we were compelled to make some changes to our programs (the major and honours in particular) to help ensure the success of our students after graduation. The changes to the Honours are substantial, and consist of a complete restructuring of the program. We have moved away from the increased credit requirement (132 required credits) to a more easily attainable 120 credits, but with the addition of an honours module course. We have increased the lower-level requirements to those of the new Physics major, and added in an additional 5 required upper-level courses compared to the major. The course requirements and structure of the new proposed honours degree is more inline with other honours degrees offered within the BSc, as well as more consistent with honours degrees from similar institutions. We have also changed the entrance and graduation requirements to the honours program, where the change to the entrance requirements was necessary in order to be able to ensure that students can enrol in PHYS 499 (honours module). We also altered the graduation requirement to a CGPA of 3.33, as this is the minimum requirement for entrance into graduate programs (which is where we expect our honours graduates to go).*

3. If program outcomes are new or substantially changed, explain how they align with the Institutional Learning Outcomes:

The program outcomes have not changed.

4. What consideration has been given to Indigenizing the curriculum?

Indigenous pedagogies will be integrated to enhance learning. Storytelling will be used to introduce new concepts, making abstract ideas more relatable and meaningful. Collaborative group projects will encourage students to learn from one another, reflecting the communal nature of Indigenous knowledge-sharing. Hands-on learning in labs will be emphasized, with experiments designed to promote discovery-based learning, reinforcing the idea that knowledge is built through experience and exploration. The deep connection between physics and the world around us will be emphasized and examples anchored in Indigenous experience will be used when possible. By incorporating these approaches, students will engage more deeply with scientific concepts in a way that is both inclusive and impactful.

5. Will additional resources be required? If so, how will these costs be covered?

No additional resources will be required.

6. How will students be impacted? (Indicate the projected number of students impacted.) Is the change expected to increase/decrease enrolment in the program?

The impact on students will be very positive, as we have reduced the time and cost required to earn a Physics honours degree (down from 132 to 120 credits). The change is expected to increase the number of students graduating with an honours degree (we have not had an honours graduate for over 5 years), but there will be an expected decrease to the number of students earning a Physics major. So overall, the enrolment numbers in our major/honours program are not expected to be impacted, however, we do expect to see our students more readily accepted into graduate programs as a result of these changes.

7. Does the number of required core or elective credits from the program-specific discipline change? If so, will this change the total number of courses to be offered within the discipline?

Yes, we are changing both the number of required courses as well as the number of elective courses needed in order to earn a Physics honours. Overall, this will not have any effect on the number of courses that we currently offer, but it will change the frequency at which certain courses will need to be offered (specifically PHYS 321 and PHYS 393). We have come up with a schedule that will accommodate these changes in course offerings to ensure that students are able to earn an honours degree in 4 years.

8. Identify any available resources that will be used to accommodate the program changes. (Eg. seats in existing classes, conversion of sections, timetabling changes, deletion of courses, etc.)

No additional resources will be required in order to implement the proposed changes.

9. Is the number of required or elective courses from other disciplines in the program changing? If so, what is the estimated impact to enrolments in these courses? Provide a memo from the respective dean(s) of the impacted faculty to confirm if budgetary implications have been considered and addressed.

The total number of courses required from other disciplines has not changed (specifically from Math), but we have listed additional options for upper-level courses from other disciplines. We do not expect these changes to impact any other disciplines.

10. Provide a memo from the program's dean to confirm that budgetary implications of the proposed changes have been considered and will be addressed within the faculty budget.

See attached note from the Dean of ATS.



DATE: April 3, 2025
TO: UEC, Faculty of Science
CC: Dr. Jeff Chizma, Department Head, Physics & Engineering
FROM: Dr. Teresa Kisilevich, Dean, Faculty of Applied and Technical Studies
RE: Program change – Bachelor of Science, Physics Honours

I have reviewed the proposed changes to the Physics Honours, with particular care to the scheduling and budgetary implications should these changes be implemented. I am confident that any budgetary implications can be managed within the current faculty budget.

Physics Honours

This section specifies the Physics Honours requirements only. Please refer to the [Bachelor of Science](#) section for information on additional requirements, as well as the requirements for a [Physics major](#).

~~Physics Honours will be awarded to students who declare the Physics major and have also completed the Physics Honours requirements.~~

Entrance requirements

Minimum CGPA of 3.33, completion of all lower-level requirements of the Physics major, and completion of three 300-level PHYS courses with a grade of B or better in each.

How to apply

Students in the Physics major program who wish to enter the Physics honours program must first attain approval from the Physics department before they will be allowed to enrol in PHYS 499. Contact the Physics department head for more information on the approval process.

Program requirements

To earn a Physics Honours students must:

1. Complete all of the lower-level requirements for the Physics major
2. Complete the following courses:

<u>Course</u>	<u>Title</u>	<u>Credits</u>
<u>PHYS 311</u>	<u>Statistical Physics</u>	<u>3</u>
<u>PHYS 312</u>	<u>Intermediate Electromagnetism</u>	<u>3</u>
<u>PHYS 321</u>	<u>Advanced Mechanics</u>	<u>3</u>
<u>PHYS 351</u>	<u>Quantum Mechanics</u>	<u>3</u>
<u>PHYS 352</u>	<u>Special Relativity and Classical Fields</u>	<u>3</u>
<u>PHYS 381/ MATH 381/ ENGR 257</u>	<u>Mathematical Physics</u>	<u>3</u>

<u>PHYS 382</u>	<u>Modern Physics Laboratory I</u>	<u>3</u>
<u>PHYS 393</u>	<u>Computational Physics I</u>	<u>3</u>
<u>PHYS 412</u>	<u>Advanced Electromagnetism</u>	<u>3</u>
<u>PHYS 451</u>	<u>Advanced Quantum Mechanics</u>	<u>3</u>
<u>PHYS 499</u>	<u>Physics Honours Module</u>	<u>1</u>
<u>MATH 221</u>	<u>Linear Algebra</u>	<u>3</u>
<u>Plus:</u>	<u>6 upper-level credits in BIO, CHEM, COMP, MATH, or STAT</u>	<u>6</u>

3. Earn a minimum grade of B in PHYS 499 offered in conjunction with an upper-level PHYS course approved by the Physics department.
4. Have a minimum GPA of 3.33 on all PHYS courses used towards the degree.
5. Have a minimum CGPA of 3.33 upon graduation.

Note: Students must complete a minimum of 21 upper-level PHYS credits at UFV.

Lower-level requirements

The lower-level requirements for the Physics Honours are the same as the lower-level requirements for the Physics major, with the addition of the following courses:

Course	Title	Credits
MATH 152/ ENGR 152	Linear Algebra for Engineering	3-4
or MATH 221	Linear Algebra (see Note)	-
MATH 255/ ENGR 255	Ordinary Differential Equations	3
COMP 152	Introduction to Structured Programming	4-8
or the combination of:		
COMP 150	Introduction to Programming	-
and COMP 155	Object-oriented Programming	-

~~Note: MATH 221 should be taken as opposed to MATH 152/ENGR 152 if students wish to add a Mathematics major or minor.~~

Upper-level requirements

Course	Title	Credits
MATH 322	Complex Variables	3
PHYS 402	Advanced Optics	3
PHYS 311	Statistical Physics	3
PHYS 312	Intermediate Electromagnetism	3
PHYS 351	Quantum Mechanics	3
PHYS 381/ MATH 381/ ENGR 257	Mathematical Physics	3
PHYS 412	Advanced Electromagnetism	3
PHYS 451	Advanced Quantum Mechanics	3
Plus:	An additional MATH course numbered 300 or higher (MATH 312 recommended)	3
Plus:	An additional PHYS course with a prerequisite numbered 300 or higher	3
Two of:		6-9
ENPH 310	Microelectronics	-
ENPH 320	Fundamentals of Digital Logic and Design	-
ENPH 360	Interfacing and Virtual Instrumentation	-
PHYS 382	Modern Physics Laboratory I	-
PHYS 483	Modern Physics Laboratory II (formerly PHYS 383)	-
PHYS 485	Nonlinear Physics Laboratory (discontinued)	-
One of:		3
-	Any COMP course	-
PHYS 393	Computational Physics I	-
PHYS 484	Nonlinear Physics (discontinued)	-
PHYS 485	Nonlinear Physics Laboratory (discontinued)	-
PHYS 493	Computer Algebra Physics II	-
MATH 316	Numerical Analysis	-

Breadth requirements

Course	Title	Credits
Two of:		7-10
ASTR 103	Astronomy: The Solar System	-
ASTR 104	Stars, Galaxies, and the Cosmos	-
CHEM 113	Principles of Chemistry I	-
CHEM 114	Principles of Chemistry II	-
MATH 125	Introduction to Discrete Mathematics	-
MATH 270/ STAT	Introduction to Probability and Statistics	-

270

BIO-111	Introductory Biology I	-
BIO-112	Introductory Biology II	-
-	Any BUS, ECON, or Arts course	-

Note: More courses may be added as new courses are added to the calendar, but may not yet be included on this list. Check with the Department of Physics to see if there have been any additions.

Students should note the prerequisite requirements for these courses.

By choosing the appropriate options within the Physics Honours, students will also meet all the requirements for a Mathematics minor.

Program requirements

The GPA calculated from all courses that students use towards their degree must be at least 3.33. In addition, the GPA in all Physics courses used towards the degree must be at least 3.33.

Students in the Physics major do not need to apply to the honours program, but they may graduate from the honours program once all requirements have been met.

Residency

Students must complete at least 21 upper-level Physics credits at UFV.

Graduation requirements

- At least 132 credits total
- At least 54 upper-level credits
- At least 45 of the upper-level credits must be from physics or math
- At least 39 of the upper-level credits must be from physics


ORIGINAL COURSE IMPLEMENTATION DATE:
REVISED COURSE IMPLEMENTATION DATE:
COURSE TO BE REVIEWED (six years after UEC approval):

Course outline form version: 06/18/2021

OFFICIAL UNDERGRADUATE CROSS-LISTED OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PLAN 260	Number of Credits: 3 Course credit policy (105)
Course Full Title: Global Goals Studio: Sustainable Communities by Design	
Course Short Title: Sustainable Community Design	
Faculty: Faculty of Science	Department (or program if no department): Planning, Geography and Environmental Studies
Official Course Outline:	
This is a cross-listed course. Please refer to GEOG 260 for the official course outline.	
Calendar Description:	
Introduction to the critical issues of our times including food security, climate change, biodiversity loss, sea-level rise, and sustainable land use. Exploration of land-based planning policies, scientific data, and concepts of spatial justice required to address global challenges. Applying the lens of UN Sustainable Development Goals, and specifically SDG 11 and Human Rights legislation as a global challenge statement where students work with community partners to design a response to secure more sustainable, equitable, and resilient communities.	
Note: Field trips outside of class time will be required. Please refer to the department website for scheduling information.	
Note: This course is offered as GEOG 260 and PLAN 260. Students may take only one of these for credit.	
Prerequisites (or NONE):	15 university-level credits.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: GEOG 260 Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>	Transfer Credit (See bctransferguide.ca) Transfer credit already exists: Click to select Submit outline for (re)articulation: [click to select] <i>(If yes, fill in transfer credit form.)</i>
Department / Program Head or Director: Afia Raja	Date approved: April 25, 2025
Faculty Council approval	Date approved:
Undergraduate Education Committee (UEC) approval	Date of meeting:



ORIGINAL COURSE IMPLEMENTATION DATE: September 2022
 REVISED COURSE IMPLEMENTATION DATE:
 COURSE TO BE REVIEWED (six years after UEC approval): January 2028
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: GEOG 260/ PLAN 260		Number of Credits: 3 Course credit policy (105)													
Course Full Title: Global Goals Studio: Sustainable Communities by Design															
Course Short Title: Sustainable Community Design															
Faculty: Faculty of Science		Department/School: Planning, Geography and Environmental Studies School of Land-Use and Environmental Change													
Calendar Description: Introduction to the critical issues of our times including food security, climate change, biodiversity loss, sea-level rise, and sustainable land use. Exploration of land-based planning policies, scientific data, and concepts of spatial justice required to address global challenges. Applying the lens of UN Sustainable Development Goals, and specifically SDG 11 and Human Rights legislation as a global challenge statement where students work with community partners to design a response to secure more sustainable, equitable, and resilient communities. Note: Field trips outside of class time will be required. Please refer to the department website for scheduling information. Note: This course is offered as GEOG 260 and PLAN 260. Students may take only one of these for credit.															
Prerequisites (or NONE):		15 university-level credits.													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):															
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: PLAN 260 Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>		Course Details Special Topics course: No <i>(If yes, the course will be offered under different letter designations representing different topics.)</i> Directed Study course: [click to select] <i>(See policy 207 for more information.)</i> Grading System: Letter grades Delivery Mode: [click to select] Expected frequency: Every semester Maximum enrolment (for information only): 36													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>25</td> </tr> <tr> <td>Tutorials/workshops</td> <td>5</td> </tr> <tr> <td>Supervised laboratory hours (science lab)</td> <td></td> </tr> <tr> <td>Experiential (work-integrated learning)</td> <td>15</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Total hours</td> <td>45</td> </tr> </table>		Lecture/seminar	25	Tutorials/workshops	5	Supervised laboratory hours (science lab)		Experiential (work-integrated learning)	15			Total hours	45	Prior Learning Assessment and Recognition (PLAR) [click to select]	
Lecture/seminar	25														
Tutorials/workshops	5														
Supervised laboratory hours (science lab)															
Experiential (work-integrated learning)	15														
Total hours	45														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: No		Transfer Credit (See bctransferguide.ca .) Transfer credit already exists: No Submit outline for (re)articulation: Yes <i>(If yes, fill in transfer credit form.)</i>													
Department approval: Jonathan-HughesAfia Raja		Date of meeting: April 2024 25 April 2025													
Faculty Council approval		Date of meeting: May 28, 2021													
Undergraduate Education Committee (UEC) approval		Date of meeting: January 28, 2021													

Learning Outcomes)

Upon successful completion of this course, students will be able to:

1. Acknowledge and integrate Indigenous ways of knowing into assessing sustainable development and monitoring UN-Sustainable Development Goals (SDGs) with a focus on climate change, food security, and spatial justice.
2. Identify the key elements of Agenda 2030 and SDGs from a theoretical and practical ~~perspective, and perspective and~~ discuss their relevance to the community level.
3. Describe what "sustainability" and "sustainable development" mean in the context of community development and planning, as well as the challenges employing and operationalizing these terms through a social justice lens.
4. Examine local and regional sustainability challenges, policies, and strategies in a manner that recognizes the relationships between social, economic, cultural, political, and environmental systems.
5. Examine sustainability issues and actions at the local level, and recognize their relationships to regional, national, and global scales.
6. Identify, synthesize, and apply key theories and practices that inform the field of sustainable and resilient community development through an equity and diversity lens.
7. Engage in critical thinking on sustainability issues by reflecting on expert presentations (i.e. Indigenous elders, UN officials, local and regional practitioners, seminal researchers, and scholars).
8. Identify the skills, techniques and roles important to addressing global sustainable development challenges at local scales.
9. Work collaboratively with community or civic partners to engage in an innovative partnership to address a sustainable development challenge.
10. Assess one's own ethics and future career goals in relation to UN SDGs and sustainability frameworks.

Recommended Evaluation Methods and Weighting (Evaluation should align to learning outcomes.)

Final exam:	Assignments:	Field experience:	20%	Portfolio	0%
Midterm exam:	Project:	Practicum:	0%	Total:	100%

Details:

(Provide a full assessment breakdown and any other relevant information.)

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.)

This interactive and participatory course provides opportunities for discussion, problem-solving, debate, and sharing ideas with the involvement of the instructor, special guests, SLUEC faculty, community partners and all students in the class. Each module will include readings and other learning materials, discussed in a seminar format. Preparation for weekly seminars is critical to successful learning and therefore mandatory. Each class will also include dynamic learning activities where students will work with community partners to address a challenge of mutual interest with community partners. The scaffolding assignment outcome could include a local or global response to a sustainability challenge of value to the partners such as a film, website, campaign, policy brief, or report to share their recommendations for action. This course will typically be offered in a condensed semester format. Invitations to Indigenous leaders and community leaders to be given to present and/or propose a course challenge project.

Global experiential learning related to Climate Change Lab and SDG platform is to be integrated into the course as an assignment based on a partnership with world climate simulation lab.

Texts and Resource Materials (Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)

Type	Author or description	Title and publication/access details	Year
1. [click-to-select]Book	Breidlid, A. & R. Krovel, ed.	Indigenous Knowledges and the Sustainable Development Agenda / Routledge	2020
2. [click-to-select]Book	Sachs, J	The Age of Sustainable Development / Columbia University Press	2020
3. [click-to-select]Article	UN General Assembly	UN General Assembly. Transforming our World: the 2030 Agenda for Sustainable Development. / Report No. A/RES/70/1	2020
4. [click-to-select]Book	Dale, A	Edging Forward: Achieving Sustainable Community Development / Fernweh Press	2018
5. [click-to-select]Book	Dale, A., Foon, R., Herbert, Y., & Newell, R	Community Vitality: From Adaptation to Transformation / Fernweh Press	2014

Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)

(Use this section for supplies and materials for all sections of this course.)

Course Content and Topics

- Module 1: Sustainable development: history of the concept, theory, and frameworks (SDGs) and movements for change
- Module 2: Sustainable development and systems thinking (interconnected and multi-scalar challenges); introduction to human centered design
- Modules 3-6: Critical challenges for sustainable community development (climate change, ecosystem health, food security, sense of place, community health, and livability); introduction to community challenge; sustainability challenge focus
- Module 7: Strategies and approaches to sustainable community development (climate change mitigation and adaptation, green infrastructure, land-use planning, and policy)
- Module 8: Social capital, empowerment, and participatory processes
- Module 9-10: Critical community project: human centered design strategy
- Module 11-13: Project presentations and reflection

Memo for Course Changes

To: FSCC

From: Cherie Enns, Chair, BRCP, and Afia Raja, Head, PGES

Date: 25 April 2025

Subject: Proposal for cross-listing Geog 260 with PLAN 260

Note that even minor changes may result in comments from committees on all aspects of the course.

1. Summary of changes (select all that apply):

- ☐ Six-year review
- ☒ Number and/or course code
- ☐ Credits and/or total hours
- ☐ Title
- ☐ Calendar description
- ☐ Prerequisites and/or co-requisites
- ☐ Frequency of course offering
- ☐ Learning outcomes
- ☐ Delivery methods and/or texts and resource materials
- ☐ PLAR options, grading system, and/or evaluation methods
- ☐ Discontinuation of course
- ☐ Other – Please specify:

2. Rationale for change:

Change to GEOG 260: As part of applying for accreditation from the Planning Standards Board, selected planning-focused courses in the Geography program that support other programs (such as Global Development Studies) are being shifted to cross-list with Planning courses

Course Updates Accordingly, the following changes have been made:

- GEOG 260 is to be crosslisted with PLAN 260.

3. If there are substantial changes to the learning outcomes, explain how they align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

4. Is this course required by any program beyond the discipline? If so, how will this change affect that program or programs?

The course is an option for the Sojust students, and this change will have no impact.

5. Which program areas have been consulted about the change(s)?

None outside of PGES.

6. In what ways does this course (not just the proposed changes) contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

This course serves as an application of learning and ethical training developed through either the BRCP degree. This includes prior coursework (reflected in prerequisites) that address Indigenous knowledges, values and practices in planning, and ethical practice more generally. Applied studio projects are high-impact courses (identified as KPI) that improve employability (another KPI). These placements also deepen UFV's engagement with our communities, particularly when placements link applied research to community projects (KPI).

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?

As this is an applied course, the course focuses on core topics important to all workplaces. This includes consideration of how diversity is an asset and factor in communications carried out in both the workplace and in community settings. In addition, students are expected to speak to the integration of EDI principles into planning practices and commit to respecting these principles in the applied work they do as part of the studio course.

8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc.

9. Estimate of the typical costs for this course, including textbooks and other materials (excluding tuition):

[None generally expected.](#)

Memo for Course Changes

To: Science Faculty Council, Undergraduate Education Committee

From: Ben Vanderlei

Date: May 6, 2025

Subject: Proposal for revision of MATH 152

Note that even minor changes may result in comments from committees on all aspects of the course.

1. Summary of changes (select all that apply):

- ☒ Six-year review
- ☐ Number and/or course code
- ☒ Credits and/or total hours
- ☐ Title
- ☒ Calendar description
- ☒ Prerequisites and/or co-requisites
- ☐ Frequency of course offering
- ☒ Learning outcomes
- ☒ Delivery methods and/or texts and resource materials
- ☐ PLAR options, grading system, and/or evaluation methods
- ☐ Discontinuation of course
- ☐ Other – Please specify:

2. Rationale for change: *MATH/ENGR 152 is overdue for review. The most significant changes proposed are the reduction in credits from 4 to 3, and a change to the corequisites/prerequisites. The change in credits was made at the request of the Physics department and is part of a broader effort to reduce the number of credits in the Engineering Transfer Program. To accommodate the corresponding reduction in contact time, two applications (systems of differential equations and Fourier approximations) were removed from the learning outcomes and course content. Other learning outcomes were adjusted accordingly to reflect the applied nature of the course. With the removal of these applications that were dependant on MATH 112 concepts, students should be adequately prepared for MATH 152 after successfully completing MATH 111. Removing MATH 112 as a corequisite also provides students flexibility if they do not continue on to MATH 112 immediately following MATH 111.*
3. If there are substantial changes to the learning outcomes, explain how they align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#): *The learning outcomes have been reduced but have not changed substantially.*
4. Is this course required by any program beyond the discipline? If so, how will this change affect that program or programs? *MATH/ENGR 152 specifically serves students in the Engineering Transfer Program. Efforts to reduce credits across the program are being made to improve student success.*

5. Which program areas have been consulted about the change(s)? *We have worked closely with Physics on these revisions.*
6. In what ways does this course (not just the proposed changes) contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).
MATH/ENGR 152 is a service course to with provincial standards for the course topics. It is through delivery that this course aligns with the Indigenization goals of UFV. Instructors of the course integrate applications and experiential practices so that that learners contextualize the concepts and are required to learn by doing.
7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?
In addition to providing supportive classroom environments, MATH/ENGR 152 software used is open-source and web-based where possible to ensure that it is accessible to students.
8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc.)
9. Estimate of the typical costs for this course, including textbooks and other materials (excluding tuition): *The cost of the ebook currently in use is approximately \$70.*



ORIGINAL COURSE IMPLEMENTATION DATE: September 1994
 REVISED COURSE IMPLEMENTATION DATE: January 2018
 COURSE TO BE REVIEWED (six years after UEC approval): June 2023
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 152		Number of Credits: 34 Course credit policy (105)													
Course Full Title: Linear Algebra for Engineering															
Course Short Title:															
Faculty: Faculty of Science		Department/School: Mathematics & Statistics													
Calendar Description:															
Intended for engineering students, this course covers basic problems and concepts of linear algebra in $\mathbb{R}^n$ Euclidean space, such as matrix algebra, solutions to linear systems of equations, determinants, and eigenvalue problems. Emphasis throughout the course is placed on applications in science and engineering.															
Note: Students with credit for MATH 152 cannot take ENGR 152 for further credit, and vice versa.															
Prerequisites (or NONE):		MATH 111 None													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):		MATH 112													
Antirequisite Courses (Cannot be taken for additional credit.) Former course code/number: Cross-listed with: ENGR 152 Equivalent course(s): (If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)		Course Details Special Topics course: No (If yes, the course will be offered under different letter designations representing different topics.) Directed Study course: No (See policy 207 for more information.) Grading System: Letter grades Delivery Mode: Face-to-face only Expected frequency: Winter only Maximum enrolment (for information only): 36													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>560</td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>Total hours</td> <td>560</td> </tr> </table>		Lecture/seminar	560	[click to select]		[click to select]		[click to select]		[click to select]		Total hours	560	Prior Learning Assessment and Recognition (PLAR) PLAR is available for this course.	
Lecture/seminar	560														
[click to select]															
[click to select]															
[click to select]															
[click to select]															
Total hours	560														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: No		Transfer Credit (See bctransferguide.ca) Transfer credit already exists: Yes Submit outline for (re)articulation: Yes (If yes, fill in transfer credit form .)													
Department approval		Date of meeting:													
Faculty Council approval		Date of meeting: April 28, 2017													
Undergraduate Education Committee (UEC) approval		Date of meeting: June 16, 2017													

Learning Outcomes (These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)

Upon successful completion of this course, students will be able to:

1. ~~Construct and Solve~~ solve linear systems of equations ~~that arise in applications.~~
2. Determine whether a set of vectors is linearly independent.
3. ~~Identify or Construct~~ construct abases for subspaces of $\mathbb{R}^n$ ~~basis for a vector space to~~ and determine ~~their~~its dimensions.
4. Determine whether a transformation is linear and represent linear transformations as matrix multiplication.
5. Perform operations of matrix algebra.
6. Calculate ~~and interpret~~ determinants.
7. Determine the eigenvalues and eigenvectors of matrices, and use them ~~to diagonalize matrices for diagonalization and applications when appropriate.~~
8. ~~Perform elementary algebraic operations with complex numbers.~~
- 9-8. ~~Construct solutions to linear systems of ordinary differential equations.~~
10. Calculate the projection of a vector onto a ~~vector~~ subspace using ~~dot inner~~ products.
- 11-9. ~~Compute Fourier approximations.~~
- 12-10. Use ~~software appropriate technology~~ to perform the calculations associated with the previous objectives ~~in larger systems.~~

Recommended Evaluation Methods and Weighting (Evaluation should align to learning outcomes.)

Final exam:	35 40%	Assignments:	15%	[click to select]	%
Quizzes/tests/midterm:	51 05%	Quizzes/tests/midterm:	40 0%	[click to select]	%

Details:

Students must achieve at least 40% on the final exam in order to receive credit for this course.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.)

Lectures, with tutorial sessions.

Texts and Resource Materials (Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)

Type	Author or description	Title and publication/access details	Year
1. Book	Lay D., Lay, S., & McDonald, J.	Linear Algebra and its Applications, 6th ed. Pearson	2020
2. Book	Strang, G	Linear Algebra and its Applications, 4th ed. Thompson	2005
3. Book OER	Kuttler, K. Herman, E., & Pepe, M.	A First Course in Linear Algebra, LibreTexts Visual Linear Algebra, Wiley	2017
4. [click to select]			
5. [click to select]			

Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)

~~The course will use open-source software such as GNU Octave or Python. (Use this section for supplies and materials for all sections of this course.)~~

Course Content and Topics

~~Use of graphing calculator and/or CAS expected.~~ Most examples and demonstrations will be in terms of 2- and 3-dimensions. ~~Software will be used where appropriate~~

1. Linear systems of equations; row-reduced echelon form, rank; ~~applications of linear systems.~~
2. ~~The vector space $\mathbb{R}^n$~~ Vector space, dot product, ~~and, vector product (in 3D);~~ applications to 2D and 3D geometry.
3. Matrix algebra, elementary matrices, inverses, transposes.
4. Matrix ~~form of geometrically defined representation of~~ linear transformations; ~~applications of linear transformations.~~
5. ~~Calculation of Properties of~~ determinants ~~and properties of determinants.~~
6. Linear dependence and independence, span, dimension.
7. Orthogonal transformations, orthonormal basis.
8. Algebra of complex numbers; ~~De Moivre's theorem.~~
9. ~~Eigenvalues / eigen~~vectors, diagonalization, symmetric matrices.
10. ~~Linear systems of differential equations, diagonalizable case, 2x2 nondiagonalizable case.~~
- 11-9. ~~Fourier series approximations.~~

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ORIGINAL COURSE IMPLEMENTATION DATE: September 1994
 REVISED COURSE IMPLEMENTATION DATE: January 2018
 COURSE TO BE REVIEWED (six years after UEC approval): June 2023
 Course outline form version: 06/18/2021

OFFICIAL UNDERGRADUATE CROSS-LISTED OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: ENGR 152		Number of Credits: 34 Course credit policy (105)	
Course Full Title: Linear Algebra for Engineering			
Course Short Title:			
Faculty: Faculty of Science		Department (or program if no department): Mathematics & Statistics	
Official Course Outline: This is a cross-listed course. Please refer to MATH 152 for the official course outline.			
Calendar Description: Intended for engineering students, this course covers basic problems and concepts of linear algebra in Euclidean-space $\mathbb{R}^n$, such as matrix algebra, solutions to linear systems of equations, determinants, and eigenvalue problems. Emphasis throughout the course is placed on applications in science and engineering. Note: This course is offered as MATH 152 and ENGR 152. Students may take only one of these for credit. Note: Students with credit for _____ cannot take this course for further credit.			
Prerequisites (or NONE):		MATH 111 (Must be identical to that of the main official course outline.)	
Corequisites (if applicable, or NONE):			
Pre/corequisites (if applicable, or NONE):		MATH 112	
Antirequisite Courses (Cannot be taken for additional credit.) Former course code/number: Cross-listed with: MATH 152 Equivalent course(s): (If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)		Transfer Credit (See bctransferguide.ca) Transfer credit already exists: Yes Submit outline for (re)articulation: click to select Yes (If yes, fill in transfer credit form .)	
Department / Program Head or Director: <u>Ben Vanderlei</u>		Date approved: _____ <u>Apr. 28, 2025</u>	
Faculty Council approval		Date approved: _____ <u>April 28, 2017</u>	
Undergraduate Education Committee (UEC) approval		Date of meeting: _____ <u>June 16, 2017</u>	

Memo for Course Changes

To: Science Faculty Council, Undergraduate Education Committee

From: Ben Vanderlei, Department Head of Math & Stats

Date: May 6, 2025

Subject: Proposal for revision of MATH 415

Note that even minor changes may result in comments from committees on all aspects of the course.

1. Summary of changes (select all that apply):

- ☒ Six-year review
- ☐ Number and/or course code
- ☐ Credits and/or total hours
- ☐ Title
- ☒ Calendar description
- ☒ Prerequisites and/or co-requisites
- ☐ Frequency of course offering
- ☒ Learning outcomes
- ☒ Delivery methods and/or texts and resource materials
- ☐ PLAR options, grading system, and/or evaluation methods
- ☐ Discontinuation of course
- ☐ Other – Please specify:

2. Rationale for change: *MATH 415 is due for a six-year review. The focus of the course learning outcomes has been shifted to be more applied than theoretical, though they have not been changed substantially. Corresponding minor changes have been made in the calendar description. MATH 265 has been removed as a prerequisite to the course to make it accessible to a larger cohort of students. With less theoretical emphasis in the course, we feel that MATH 265 is not necessary for students to be successful in MATH 415.*

3. If there are substantial changes to the learning outcomes, explain how they align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

No substantial changes have been made to the learning outcomes.

4. Is this course required by any program beyond the discipline? If so, how will this change affect that program or programs?

MATH 415 is not a required course in any program.

5. Which program areas have been consulted about the change(s)? *None.*

6. In what ways does this course (not just the proposed changes) contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic](#)

[Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

Note that MATH 415 and 416 have closely related content and play a similar role in our academic programs. The method of delivery is consistent between the two courses and includes emphasis on the importance of practice and self-assessment in meeting the learning objectives. Learning in ways that are experiential and reflective, and that require time and patience, are among the [First Peoples Principles of Learning](#).

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?
MATH 415 and 416 are conducted in supportive and inclusive spaces, with diverse viewpoints welcomed. Learners in these courses are encouraged to share their perspectives on course content and potential applications.
8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc).
9. Estimate of the typical costs for this course, including textbooks and other materials (excluding tuition): *Expected textbook cost is \$80-100.*



ORIGINAL COURSE IMPLEMENTATION DATE:

September 2005

REVISED COURSE IMPLEMENTATION DATE:

COURSE TO BE REVIEWED (six years after UEC approval):

Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 415		Number of Credits: 3 3 Course credit policy (105)													
Course Full Title: Ordinary Differential Equations II															
Course Short Title: ODEs II (To be assigned by OReg based on university standards.)															
Faculty: Faculty of Science		Department/School: Mathematics and Statistics													
Calendar Description:															
Qualitative properties of differential equations and systems of differential equations. Existence and uniqueness theorems for nonlinear systems, iterative techniques to approximate solutions, oscillation and comparison theorems for second-order linear equations, matrix techniques for linear systems, diffeomorphisms for nonlinear systems, and Lyapunov functions stability analysis. Examples drawn from mechanical vibrations, lasers, biological rhythms, superconducting circuits, insect outbreaks and chemical oscillators.															
Prerequisites (or NONE):		MATH 211, MATH 255, one of (MATH 214 or MATH 265), and one of (MATH 152 or MATH 221).													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):															
Antirequisite Courses (Cannot be taken for additional credit.) Former course code/number: Cross-listed with: Equivalent course(s): (If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)		Course Details Special Topics course: No (If yes, the course will be offered under different letter designations representing different topics.) Directed Study course: click to select No (See policy 207 for more information.) Grading System: Letter grades Delivery Mode: click to select Face-to-face only Expected frequency: Every other year Every three years Maximum enrolment (for information only): 36													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>5045</td> </tr> <tr> <td>click to select</td> <td></td> </tr> <tr> <td>click to select</td> <td></td> </tr> <tr> <td>click to select</td> <td></td> </tr> <tr> <td>click to select</td> <td></td> </tr> <tr> <td>Total hours</td> <td>5045</td> </tr> </table>		Lecture/seminar	5045	click to select		click to select		click to select		click to select		Total hours	5045	Prior Learning Assessment and Recognition (PLAR) PLAR is available for this course. Yes No	
Lecture/seminar	5045														
click to select															
click to select															
click to select															
click to select															
Total hours	5045														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: No		Transfer Credit (See bctransferguide.ca .) Transfer credit already exists: No Submit outline for (re)articulation: click to select Yes (If yes, fill in transfer credit form .)													
Department approval		Date of meeting: Apr. 28, 2025													
Faculty Council approval		Date of meeting:													
Undergraduate Education Committee (UEC) approval		Date of meeting:													

Learning Outcomes (These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)

Upon successful completion of this course, students will be able to:

On completion of the course, the successful student will be able to:

1. Discuss the proofs and relevance of fundamental theorems of ODE theory, for example, uniqueness under Lipschitz continuity;
2. Determine qualitative properties of zeroes of solutions; Perform linear stability analysis of fixed points of one-dimensional flows
3. Perform phase plane analysis of linear systems
4. Use diffeomorphisms to analyse local behaviour of nonlinear systems.
3. Construct Lyapunov functions to prove stability.
4. Convert a differential equation to an equivalent integral equation and solve by Picard iteration.
5. Recognize and sketch diagrams of different types of bifurcations such as saddle-node, transcritical, pitchfork and imperfect.

Recommended Evaluation Methods and Weighting (Evaluation should align to learning outcomes.)

Final exam:	40%	Assignments:	40%	Quizzes/tests/midterm:	20%
[click to select]	%	[click to select]	%	[click to select]	%

Details:

(Provide a full assessment breakdown and any other relevant information.)

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.)

Primarily lecture based

Texts and Resource Materials (Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)

Type	Author or description	Title and publication/access details	Year
1. Textbook	Arnold, V.I. Strogatz, S.	Ordinary differential equations Nonlinear Dynamics and Chaos	2015-978
2. Textbook	Birkhoff, G., G.-C. Rota Perko, L. Perko,	Ordinary differential equations Differential Equations and Dynamical Systems	2006-989
3. Textbook	Hirsch, M.W., S. Smale	Differential Equations, Dynamical Systems and Linear Algebra	1974
4. [click to select]	Simmons, G.W.	Differential equations with applications and historical notes	1991
5. [click to select]	Waltman, P.	A second course in elementary differential equations	2004

Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)

(Use this section for supplies and materials for all sections of this course.)

Course Content and Topics

1. Existence theorem, Lipschitz condition, uniqueness theorem for first order nonlinear systems.
2. Sturm oscillation and separation theorems for approximate behaviour of zeroes of second order linear equations.
3. Matrix methods for linear systems, exponential of a matrix, classification of critical points using eigenvalues.
4. Study of critical points of nonlinear systems by diffeomorphism to linear systems.
5. Lyapunov functions, energy estimates.
6. Equivalent integral equations, Picard iteration, contraction mappings.
 1. One-dimensional flows
 - a. Flows on the line
 - b. Bifurcations
 - c. Flows on the circle
 2. Two-dimensional flows
 - a. Linear systems
 - b. Phase plane analysis
 - c. Poincaré-Bendixson theory
 3. Qualitative and approximate asymptotic techniques.
 - a. Saddle-Node, transcritical, and pitchfork bifurcations
 - b. Hopf bifurcations

[COURSE]

University of the Fraser Valley Official Undergraduate Course Outline

Page 3 of 3

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Memo for Course Changes

To: Science Faculty Council, Undergraduate Education Committee

From: Ben Vanderlei, Department Head of Math & Stats

Date: May 6, 2025

Subject: Proposal for revision of MATH 416

Note that even minor changes may result in comments from committees on all aspects of the course.

1. Summary of changes (select all that apply):

- ☒ Six-year review
- ☐ Number and/or course code
- ☐ Credits and/or total hours
- ☐ Title
- ☒ Calendar description
- ☒ Prerequisites and/or co-requisites
- ☐ Frequency of course offering
- ☒ Learning outcomes
- ☒ Delivery methods and/or texts and resource materials
- ☐ PLAR options, grading system, and/or evaluation methods
- ☐ Discontinuation of course
- ☐ Other – Please specify:

2. Rationale for change: *MATH 416 is due for a six-year review. In this review we have removed MATH 255 as a prerequisite to the course to make it accessible to a larger cohort of students. The portion of MATH 255 material required in MATH 416 is relatively small and can be introduced as needed. Minor changes have been made to the learning outcomes and calendar description.*

3. If there are substantial changes to the learning outcomes, explain how they align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

No substantial changes have been made to the learning outcomes.

4. Is this course required by any program beyond the discipline? If so, how will this change affect that program or programs?

MATH 416 is not a required course in any program.

5. Which program areas have been consulted about the change(s)? *None.*

6. In what ways does this course (not just the proposed changes) contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

Note that MATH 415 and 416 have closely related content and play a similar role in our academic programs. The method of delivery is consistent between the two courses and includes emphasis on the importance of practice and self-assessment in meeting the learning objectives. Learning in ways that are experiential and reflective, and that require time and patience, are among the [First Peoples Principles of Learning](#).

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?
MATH 415 and 416 are conducted in supportive and inclusive spaces, with diverse viewpoints welcomed. Learners in these courses are encouraged to share their perspectives on course content and potential applications.
8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc).
9. Estimate of the typical costs for this course, including textbooks and other materials (excluding tuition): *Expected textbook cost is \$80-100.*



ORIGINAL COURSE IMPLEMENTATION DATE: January 2019
 REVISED COURSE IMPLEMENTATION DATE:
 COURSE TO BE REVIEWED (six years after UEC approval):
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 416		Number of Credits: 3 Course credit policy (105)													
Course Full Title: Partial Differential Equations															
Course Short Title: (To be assigned by OReg based on university standards.)															
Faculty: Faculty of Science		Department/School: Mathematics and Statistics													
Calendar Description: First order equations, characteristics, and shocks; classification of second order equations; well-posed problems; eigenfunction expansions; maximum principles and qualitative methods. Examples drawn from gas dynamics, heat flow, and wave phenomena, and financial mathematics.															
Note: Students with credit for cannot take this course for further credit.															
Prerequisites (or NONE):		MATH 211, one of (MATH 152 or MATH 221), MATH 255 , and MATH 265.													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):															
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>		Course Details Special Topics course: No <i>(If yes, the course will be offered under different letter designations representing different topics.)</i> Directed Study course: No <i>(See policy 207 for more information.)</i> Grading System: Letter grades Delivery Mode: Face-to-face only Expected frequency: Every three years Maximum enrolment (for information only): 36													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>50</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Total hours</td> <td>50</td> </tr> </table>		Lecture/seminar	50									Total hours	50	Prior Learning Assessment and Recognition (PLAR) PLAR is available for this course. No	
Lecture/seminar	50														
Total hours	50														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: No		Transfer Credit (<i>See bctransferguide.ca.</i>) Transfer credit already exists: No Submit outline for (re)articulation: Yes <i>(If yes, fill in transfer credit form.)</i>													
Department approval		Date of meeting: Apr. 28, 2025													
Faculty Council approval		Date of meeting:													
Undergraduate Education Committee (UEC) approval		Date of meeting:													

Learning Outcomes (These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)

Upon successful completion of this course, students will be able to:

- Classify second order equations as elliptic, parabolic or hyperbolic, and discuss the main differences between the categories
- Determine if a given boundary value problem or initial value problem is well-posed
- Solve partial differential equations in finite domains with eigenfunction expansions
- Apply appropriate methods to construct solutions of partial differential equations on infinite domains
- ~~Prove uniqueness conditions with a maximum principle~~ Derive the properties of solutions using fundamental principles of PDEs, such as conservation of total energy, heat, and maximum principles

Recommended Evaluation Methods and Weighting (Evaluation should align to learning outcomes.)

Final exam:	40%	Assignments:	40%	Quizzes/tests/midterm:	20%
[click to select]	%	[click to select]	%	[click to select]	%

Details:

(Provide a full assessment breakdown and any other relevant information.)

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.)

Lectures

Texts and Resource Materials (Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)

Type	Author or description	Title and publication/access details	Year
1. Textbook	Strauss, Walter A.	Partial Differential Equations	2008
2. Textbook	Guenther, Ronald Choksi, Rustum	Partial differential equations of mathematical physics and integral equations Partial Differential Equations: A First Course	1996 2022
3. Textbook	Drabek, Pavel Blecker David and Csordas, George	Elements of p Partial differential equations	2018 4
4. OER	Ivrii, Victor	Partial Differential Equations	2022
5. [click to select]			

Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)

(Use this section for supplies and materials for all sections of this course.)

Course Content and Topics

First order partial differential equations (PDE), characteristics, ~~shocks in gas dynamics~~.
 Derivation of the PDE of mathematical physics: heat, wave, Laplace equation.
 Classification of second order linear PDEs (canonical forms).
 D'Alembert solution for the wave equation.
 Eigenfunction expansions, separation of variables for PDEs on finite spatial domains.
 Maximum principles for the Laplace equation.
 Heat kernel and solution of the heat equation on the real line. Energy estimates.

Memo for Course Changes

To: Ben Vanderlei (Chair FoS Curriculum Committee)

From: Renee Prasad (Agriculture Dept. Head)

Date: May 12, 2025

Subject: Proposal for revision of Agri 292

Note that even minor changes may result in comments from committees on all aspects of the course.

1. Summary of changes (select all that apply):

- ☒ Six-year review
- ☐ Number and/or course code
- ☒ Credits and/or total hours
- ☒ Title
- ☒ Calendar description
- ☐ Prerequisites and/or co-requisites
- ☐ Frequency of course offering
- ☒ Learning outcomes
- ☒ Delivery methods and/or texts and resource materials
- ☒ PLAR options, grading system, and/or evaluation methods
- ☐ Discontinuation of course
- ☐ Other – Please specify:

2. Rationale for change: ***The proposed changes to Agri 292 are to incorporate some of the learning outcomes of Agri 183 + maintain the experiential component of Agri 292. We hope that by re-shifting the focus of the course towards professional practice in agrology that it will be included in the list of recognized courses by BC Institute of Agrologist. Currently neither Agri 183 or Agri 292 are recognized by BCIA. If the course is not accepted by BCIA, then there is still the advantage of reducing the number of unrecognized credits from 6 to 4.***

3. If there are substantial changes to the learning outcomes, explain how they align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#): New learning outcomes address the following UFV ILOs

<i>Proposed Course Learning Outcomes</i>	<i>UFV ILO alignment</i>
<i>Define the concept of regulated practice as it applies to agrology</i>	<i>1. Apply Knowledge and Competencies Proficiently</i> <i>6. Contribute Locally and Globally</i>
<i>Implement principles of safety culture (including risk assessment and mitigation, workplace policy and procedure development) in an agriculture context</i>	<i>1. Apply Knowledge and Competencies Proficiently</i> <i>7. Advocate for Equity, Diversity, and Inclusion</i>
<i>Describe leadership and team-building strategies used for both professional and</i>	<i>4. Lead Collaboratively</i>

<i>community engagement</i>	7. Advocate for Equity, Diversity, and Inclusion
<i>Identify communication strategies for building and sustaining reciprocal inclusive relationships with stakeholders</i>	4. Lead Collaboratively 5. Engage with Indigenous Knowledge Systems 7. Advocate for Equity, Diversity, and Inclusion
<i>Understand the role of ethics and professional development to maintain competency in professional practice</i>	8. Engage in Reflection for Action

4. Is this course required by any program beyond the discipline? If so, how will this change affect that program or programs? **N/A**
5. Which program areas have been consulted about the change(s)? Agriculture Curriculum Committee
6. In what ways does this course (not just the proposed changes) contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#). ***An important priority for the BC Institute of Agrologists is Indigenization, as part of the provinces commitments to UNDRIP. Indigenization is embedded in several of the Learning Outcomes, including inclusive reciprocal decision-making and ethics. The role of Indigenous communities in resource management will be explored through case-study and presentations by Indigenous guest speakers.***
7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods? ***Principles of EDI are reflected in several of the Learning Outcomes which emphasize collaborative leadership, communication and inclusive relationship building. As well, providing students with access to professional experiences in agricultural operations levels the playing field, for those students who are interested in agricultural careers but who do not come with previous connections (e.g. via the traditional family farms).***
8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc. ***The practicum courses were originally a minimum of 90 hours for 3 credits. These hours were completed at the end of April. Feedback from students is that this model developed in the early 1990's is no longer feasible given the realities of UFV students. The 90 unpaid hours completed over a 3-week period are especially challenging given that most students work. Previous course design also did not allow for any reflection as a group on the learning and experiences over the course of practicum. With the agrology now designated as a regulated profession we feel that the proposed changes in Learning Outcomes also reflect the new responsibilities of those who pursue careers in agriculture, regardless of their subsequent need for professional designation.***

9. Estimate of the typical costs for this course, including textbooks and other materials (excluding tuition): ***All reading materials are available online. If they do not already have, students may need safety gear including CSA-approved work shoes (\$300) and depending on the location of the practicum they may incur additional costs for transport to practicum site (\$150).***



ORIGINAL COURSE IMPLEMENTATION DATE: September 1991
REVISED COURSE IMPLEMENTATION DATE: January 2019
COURSE TO BE REVIEWED: (six years after UEC approval) September 2024
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: AGRI 292		Number of Credits: 4 Course credit policy (105)																	
Course Full Title: Leadership and Professional Experience in Agrology																			
Course Short Title (if title exceeds 30 characters): Agrology Leadership																			
Faculty: Faculty of Science		Department (or program if no department): Agriculture																	
Calendar Description: Develops leadership skills for use in agrology professions. Using case study analysis and guest lectures students develop competency in leadership areas including safety culture, reciprocal and inclusive leadership and stakeholder engagement. Students carry out their professional experience in their chosen agricultural setting under the supervision of a practicum host. Students will understand the breadth of career options available for an agriculture graduate.																			
Prerequisites (or NONE):		At least 30 AGRI credits and department permission.																	
Corequisites (if applicable, or NONE):																			
Pre/corequisites (if applicable, or NONE):																			
Equivalent Courses (cannot be taken for additional credit) Former course code/number: Cross-listed with: Equivalent course(s): <i>Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.</i>		Transfer Credit Transfer credit already exists: ☐ Yes ☒ No Transfer credit requested (OReg to submit to BCCAT): ☐ Yes ☐ No (if yes, fill in transfer credit form) Resubmit revised outline for articulation: ☐ Yes ☐ No To find out how this course transfers, see bctransferguide.ca .																	
Total Hours: 60 Typical structure of instructional hours: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr><td>Lecture hours</td><td></td></tr> <tr><td>Seminars/tutorials/workshops</td><td style="text-align: center;">21</td></tr> <tr><td>Laboratory hours</td><td></td></tr> <tr><td>Field experience hours</td><td></td></tr> <tr><td>Experiential (practicum, internship, etc.)</td><td style="text-align: center;">39</td></tr> <tr><td>Online learning activities</td><td></td></tr> <tr><td>Other contact hours: Student directed learning</td><td></td></tr> <tr><td style="text-align: right;">Total</td><td style="text-align: center;">60</td></tr> </table>		Lecture hours		Seminars/tutorials/workshops	21	Laboratory hours		Field experience hours		Experiential (practicum, internship, etc.)	39	Online learning activities		Other contact hours: Student directed learning		Total	60	Special Topics Will the course be offered with different topics? ☐ Yes ☒ No If yes, different lettered courses may be taken for credit: ☐ No ☐ Yes, repeat(s) ☐ Yes, no limit <i>Note: The specific topic will be recorded when offered.</i>	
Lecture hours																			
Seminars/tutorials/workshops	21																		
Laboratory hours																			
Field experience hours																			
Experiential (practicum, internship, etc.)	39																		
Online learning activities																			
Other contact hours: Student directed learning																			
Total	60																		
		Maximum enrolment (for information only): 25 Expected frequency of course offerings (every semester, annually, every other year, etc.): Annually																	
Department / Program Head or Director:		Date approved:																	
Faculty Council approval		Date approved:																	
Campus-Wide Consultation (CWC)		Date of posting:																	
Dean/Associate VP:		Date approved:																	
Undergraduate Education Committee (UEC) approval		Date of meeting:																	

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Define the concept of regulated practice as it applies to agrology
- Implement principles of safety culture (including risk assessment and mitigation, workplace policy and procedure development) in an agriculture context
- Describe leadership and team-building strategies used for both professional and community engagement
- Identify communication strategies for building and sustaining reciprocal inclusive relationships with stakeholders
- Understand the role of ethics and professional development to maintain competency in professional practice.

Prior Learning Assessment and Recognition (PLAR)

☐ Yes ☒ No, PLAR cannot be awarded for this course because it is a course where new skills are learned and applied in different contexts. This learning from previous course is expanded and applied in different places.

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

Practicum based learning, workshops and guest speakers

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☒

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1. Jordan, John Patrick; Buchanan, Gale A.; Clarke, Neville P.; Jordan, Kelly C.	Leadership in Agriculture	☒	Texas A&M University Press	
2. Steward, April	Country Guide. Special edition on leadership in agriculture.	☐		2024
3. Haddock, Mark	Report: Final Report of the Review of Professional Reliance in Natural Resource Decision-Making.	☐	Province of BC	2018
4. Various	BC Institute of Agrologist (website)	☒	BCIA	
5. Various	AgSafe BC (Website)	☒	AgSafe BC	

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

- Students are expected to provide transportation to practicum locations (this can include public transit)
- Appropriate work clothing and safety boots

Typical Evaluation Methods and Weighting

Final exam:	%	Assignments:	75%	Midterm exam:	%	Practicum:	25%
Quizzes/tests:	%	Lab work:	%	Field experience:	%	Shop work:	%
Journal:	%	Letter:	%	Other:	%	Total:	100%

Details (if necessary):

Assignments: Students will have to complete a number of assignments related to the in-class portions of this course, including developing a resume and cover letter (10%), developing a Professional Development plan (15%), reflection of practicum experiences (25%) and case studies (25%). Students will also work with practicum hosts to develop specific learning outcomes for their individual placements.

Practicum assessment includes feedback from the host (15%) and completion of Practicum hours (10%).

Typical Course Content and Topics

Creating a Safety Culture in Agriculture

- Risk Assessment, mitigation and management
- Building effective policies and procedures that contribute to safety
- The role of positive leadership in safety culture
- Components of safety from physical to psychological well-being

Agrology as a profession

- The Professional Reliance model of regulation
- Independent practices and employment in agriculture
- Ethical practice in agrology

Understanding leadership in agriculture

- Effective communication skills
- Managing conflict and developing conflict resolution strategies
- Leadership and management styles

Inclusive decision-making

- Indigenous roles in resource management
- Recognizing and including marginalized voices through planning, facilitation and goal-setting
- Identifying areas for shared decision-making in resource management

Memo for Program Changes

To: Faculty Council

From: Renee Prasad (Agriculture Department Head)

Date: May 30, 2025

Subject: Program change Bachelor of Agriculture Science

1. Summary of changes (select all the apply):

- ☐ Program revision that requires new resources
- ☒ Addition of new course options or deletion or substitution of a required course
- ☐ Change to the majority of courses in an approved program
- ☐ Change to the duration, philosophy, or direction of a program
- ☐ Addition of a new field of specialization, such as a concentration
- ☐ Change in requirements for admission
- ☐ Change in requirements for residency or continuance
- ☐ Change in admission quotas
- ☐ Change which triggers an external review
- ☐ Deletion of a program not included in the Program Discontinuance policy
- ☐ Other – Please specify:

2. Rationale for change(s): ***The BAS, Horticulture Major is now 6+ years old and several problems with the degree have been highlighted by graduates. The proposed changes are to less than 30% of the current program. The proposed changes address the following problems.***

- a. ***Reduce the number of courses that do not meet the criteria for the BC Institute of Agrologists. The original BAS degree was developed prior to an agrology designation becoming a mandatory requirement for employment. Many of the courses in Agriculture and Society are not recognized by BCIA.***
- b. ***Add courses that are recognized by BCIA either as requirements or as electives.***
- c. ***Introduce more choice in the lower-level science requirements.***
- d. ***Reduce the program to 120-credits (down from 125-credits)***
- e. ***Ensure that students who exit at Year 2 have enough course work to be eligible for Technical Agrologist designation.***

3. If program outcomes are new or substantially changed, explain how they align with the Institutional Learning Outcomes: ***There are no changes to the Program Learning Outcomes.***

4. What consideration has been given to Indigenizing the curriculum? ***The Indigenization components of the curriculum remain strong and supported throughout the courses that are both required or electives in the program. Previously IPK477 was an elective as part of Agriculture and Society. We***

have now created a required category – Indigenous Knowledge – which currently has IPK477 and Halq 101, and could expand to include more courses as they are identified or developed.

5. Will additional resources be required? If so, how will these costs be covered? ***No additional resources are required.***
6. How will students be impacted? (Indicate the projected number of students impacted.) Is the change expected to increase/decrease enrolment in the program? ***We hope that the changes will increase program retention, as currently some students are leaving the program to graduate with either an Agriculture Technology Diploma or Bachelor of Integrated Studies.***
7. Does the number of required core or elective credits from the program-specific discipline change? If so, will this change the total number of courses to be offered within the discipline? ***Yes. We will now require students to take at least one special topics course in agriculture (Agri 495, 496 or 497). One special topics course will be offered every academic year based on instructor work loads. A schedule of special topics will be posted on the Agriculture department website covering the next 3 academic years.***
8. Identify any available resources that will be used to accommodate the program changes. (Eg. seats in existing classes, conversion of sections, timetabling changes, deletion of courses, etc.) ***N/A***
9. Is the number of required or elective courses from other disciplines in the program changing? If so, what is the estimated impact to enrolments in these courses? Provide a memo from the respective dean(s) of the impacted faculty to confirm if budgetary implications have been considered and addressed. ***The number of required courses from Biology is being reduced from 4 to 3. The section called Agriculture and Society is being removed entirely. Since the BAS program is still relatively small, we do not anticipate any negative impacts to the enrolments in the courses outside of Agriculture. Some of the changes we are making (deletion of courses) are to address the infrequent offerings in some program areas. The removal of the Agriculture and Society electives allows students to have 10 “free” electives that will allow them to choose their breadth.***
10. Provide a memo from the program’s dean to confirm that budgetary implications of the proposed changes have been considered and will be addressed within the faculty budget.

EXISTING DEGREE PROGRAM			PROPOSED DEGREE PROGRAM		
Total credits required to graduate:			Total credits required to graduate:		120
Total core course credits required:			Total core course credits required:		110
Core Courses Required in Existing Degree			Core Courses Required in Proposed Degree		
Course no.	Course Name	No. of Credits	Course no.	Course Name	No. of Credits
Year 1					
	BUS 100, AGRI 142, ECON 100, ECON 101	3		AGRI 142	3
	STAT 104 or STAT 106	4		CMNS 125 or ENGL 105	3
	CMNS 125 or ENGL 105	3		CHEM 110 or CHEM 113	4-5
	CHEM 110 or CHEM 113	4-5		BIO 111	5
	BIO 111	5		AGRI 163	3
	AGRI 183	3		AGRI 204	3
	AGRI 163	3			
Required for Specialization/Concentration:			Required for Specialization/Concentration:		
	AGRI 124	3		AGRI 124	3
	AGRI 123	3		AGRI 123	3
	AGRI 129	3		AGRI 129	3
Year 2					
	BIO 201	4		BIO 220	4
	BIO 210 OR BIO 219	4		BIO 210	4
	BIO 220	4		AGRI 247	3
	AGRI 203	3		AGRI 248	3
	AGRI 204	3		AGRI 203	3
	AGRI 212	3		AGRI 212	3
	AGRI 192 (PRACTICUM)	3		AGRI 292 (PROFESSIONAL PRACTICE) – this would be a new course that is a Hybrid of Agri 183 and Practicum	4
	AGRI 272	3			
Required for Specialization/Concentration:			Required for Specialization/Concentration:		
	AGRI 220	3		AGRI 220	3
				One of AGRI 321/323/324/327/328	3
Year 3					
	CMNS 251/CMNS 257/CMNS 325	3		One of CMNS 251/CMNS 257/CMNS 325	3
	AG AND SOCIETY GEOG 311/312/313/314/340/360/364 SOC 260/360 PHIL 318 IPK/BIO 477	8		INDIGENOUS KNOWLEDGE: Bio/IPK 477 Halq 101	3-4
	AGRI 306	3		STAT 104 or STAT 106	4
	AGRI 311	3		AGRI 311	3
	AGRI 371	3		AGRI 371	3
				AGRI 272	3

				AGRI 306	3
				FOUNDATIONAL NATURAL SCIENCE BIO 201 or GEO 103	4
<i>Required for Specialization/Concentration:</i>			<i>Required for Specialization/Concentration:</i>		
	AGRI 321	3		ONE OF AGRI 321/323/324/327/328	3
	AGRI 323	3			
	AGRI 324	3			
	AGRI 327	3			
Year 4					
	AGRI 328/331 BIO 307/308/309/310/319/330/335 360/370/407/410/419/426/430 GEOG 303/308/315/318/353	14-20		TWO of AGRI 321/323/324/327/328	6
				Two of AGRI 331/490 BIO 307/308/309/310/319/330/335 360/370/407/410/419/426/430/477 GEOG 303/311/315/318/353	8-9
<i>Required for Specialization/Concentration:</i>			<i>Required for Specialization/Concentration:</i>		
	AGRI 390 OR AGRI 490	3		AGRI 390	3
				AGRI 495 OR 496 OR 497	3

Program outline

BAS general requirements

Foundational Natural Science Courses*: 21-22 credits

Course	Title	Credits
CHEM 113	Principles of Chemistry I	4–5
or CHEM 110	Introductory Chemistry	
BIO 111	Introductory Biology I	5
BIO 220	Genetics	4
BIO 210	Introduction to Ecology	4
or BIO 219/ GEOG 219	Biogeography	4
Bio 201	Cell Biochemistry/Metabolism	4
OR Geog 103	Physical Geography	

Note: Students wishing to take GEOG 353 as an Agrology elective will need GEOG 253.

Additional Foundational Courses*: 13 credits

Course	Title	Credits
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One of:		3
BUS 100	Introduction to Business	1
AGRI 142	Agribusiness Principles	3
ECON 100	Principles of Microeconomics	1
ECON 101	Principles of Macroeconomics	1
Plus:		
STAT 104	Introductory Statistics	4
or STAT 106	Statistics I	
CMNS 125	Communicating Professionally to Academic and Workplace Audiences	3
or ENGL 105	Academic Writing	
One of:		3
CMNS 251	Professional Report Writing	
GEOG 257/ CMNS 257	Environment: Science and Communications	

CMNS 325	Writing for the Sciences and Technologies	
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Agriculture in society: 8 credits

Course	Title	Credits
Eight credits from:		8
GEOG 311	Global Resources and the Environment	1
GEOG 312	Nature, Power, and Place	1
GEOG 313/ SOC 313	Agriculture and Rural Life	1
GEOG 314	Geography of Food	1
GEOG 340/ GDS 340	Geographies of Development: Landscapes of Inequality	1
GEOG 360	Introduction to Regional and Community Planning and Policy	1
GEOG 364	International Planning and Development Policy: Adapting to Climate Change	1
SOC 260/	Food for Thought: Food, Culture, and Society	1

ANTH 260		
SOC 360/ ANTH 360	Eating and Thinking: Food, Identity, and Power in Global Societies	1
PHIL 318	Environmental Ethics	-
BIO 477/IPK 477	Traditional Ecological Knowledges	4

Horticulture major requirements**

Horticulture technology: 33-36 24 credits

Course	Title	Credits
AGRI 123	Horticulture Skills I	3
AGRI 124	Introduction to Horticulture	3
AGRI 129	Horticulture Skills II	3
AGRI 163	Pest Biology and Identification	3
AGRI 183	On-Farm Occupational Health and Safety	3
AGRI 192	Practicum I	3-6
or COOP	Co-op Work Term I	1

110		
AGRI-203	Fundamentals of Integrated Pest Management	3
AGRI-204	Introduction to Soils and Soil Fertility	3
AGRI-212	Principles of On-Farm Food Protection	3
AGRI 220	Plants in the Landscape	3
AGRI 321	Vegetable Crop Production: Science & Practice	3
AGRI 323	Fruit Crop Production: Science & Practice	3
AGRI 324	Protected Crop Production: Science and Practice	3
AGRI 327	Nursery Production and Propagation: Science & Practice	3

Agrology General:** 37 credits

Course	Title	Credits
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AGRI 163	Pest Biology and Identification	3
AGRI 203	Fundamentals of Integrated Pest Management	3
AGRI 204	Introduction to Soils and Soil Fertility	3
AGRI 212	Principles of On-Farm Food Protection	3
AGRI 272	Agriculture Seminar Series	3
AGRI 247	Enterprise I	3
AGRI 248	Enterprise II	3
AGRI 292	Leadership and Professional Experience in Agrology	4
AGRI 306	Field Techniques in Integrated Pest Management (see Note)	3
AGRI 311	Sustainable Soil Management	3
AGRI 324	Vegetable Crop Production: Science & Practice	3
AGRI 323	Fruit Crop Production: Science & Practice	3
AGRI 324	Protected Crop Production: Science and Practice	3

AGRI 327	Nursery Production and Propagation: Science & Practice	3
AGRI 371	Agroecology	3
AGRI 495	Special Topics in Horticulture	3
Or AGRI 497	Special Topics in Agrology	

Note: Students who have taken AGRI 206 will be considered to have satisfied the AGRI 306 requirement. Students with AGRI 206 cannot take AGRI 306 for further credit and must ensure they satisfy the minimum of 45 upper-level credits required for the BAS degree through their selection of elective courses.

Agrology Elective course**: 14–20 8 to 9 credits

Course	Title	Credits
Two of:		
AGRI 328	Forage Crop Production: Science and Practice	3
AGRI 331	Dairy Herd Management: Science and Practice	3
AGRI 490	Directed Studies II	3
BIO 307	Anatomy and Diversity of Plants	4

BIO 308	Plant Physiology	4
BIO 309	Microbiology I	4
BIO 310	Conservation Biology	4
BIO 319/ GEOG 319	Swamps and Bogs	-
BIO 330	Plants and Animals of British Columbia	4
BIO 335/ GEOG 335	Freshwater Ecology	4
BIO 360	Insect Biology	4
BIO 370	Introduction to Mycology	4
BIO 407	Applied Biotechnology	4
BIO 410/ GEOG 410	Plant Ecology	4
BIO 419/ GEOG 419	Paleoecology	
BIO 426	Environmental Microbiology	

BIO 430	Forest Ecology	
GEOG 303	Environmental Hydrology	
GEOG 308	Climate Change and Variability	
GEOG 315	Soilscapes	
GEOG 318	Water Resources Management	
GEOG 353	GIS Applications	

Indigenous Knowledge: 3-4 credits

Course	Title	Credits
	One of:	
HALQ 101	Halq'eméylem Language 1	3
IPK/BIO 477	Traditional Ecological Knowledges	4

Independent Directed studies: 3 credits

Course	Title	Credits
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AGRI 390	Directed Studies in Agriculture II	3
or AGRI 490	Directed Studies in Agriculture III	-

Note: Specific topics to be approved by the Bachelor of Agricultural Science Program Committee.

General electives: ~~12~~ 8 – 11 credits

Course	Title	Credits
	12 8-11 university-level credits at the 100 level or higher	8 11

Co-operative Education option

The Co-operative Education option provides students with the opportunity to acquire paid, career-related work experience in conjunction with their studies in the Bachelor of Agricultural Science degree. See the [Co-operative Education](#) section for more details. Program requirements

To receive a Bachelor of Agricultural Science, students must complete ~~125~~ 120 credits including the general requirements (~~Foundational Natural Sciences, Additional Foundation Courses, and Indigenous Knowledge; lower and upper-level Science; and Agriculture in Society~~) and the Horticulture major requirements. At least 45 credits must be at the upper level.

*Foundational Natural Sciences and Additional Foundation courses fulfil the requirements of Section 1 of the BCIA Professional Agrologist Academic Worksheet

**Horticulture Major, Agrology General and Agrology Electives courses fulfil the requirements for Sections 2 and 3 of the BCIA Professional Agrologist Academic Worksheet

Memo for New Course

To: Science Faculty Council, UEC

From: Jeff Chizma, Physics department Head

Date: April 11, 2025

Subject: Proposal for new course: PHYS 281 - Theoretical Methods in Physics

There is an expectation that all new courses will meet the Guidelines for Quality Curriculum, including principles of Universal Design for Learning (UDL) and Equity, Diversity, and Inclusion (EDI).

1. Rationale for new course, including how this course fits into the program(s):

As part of the revamping of the Physics programs, we now see the need for a course in theoretical physics methods early on in second year. This new course will expose students to some specific mathematical tools that they will need for subsequent physics courses. Some of the listed topics have more comprehensive coverage in other mathematics courses (this course is not designed to replace any Math courses), but by introducing some of the more basic mathematical techniques earlier on in the program, instructors will be able to cover additional material in more advanced courses. This new course will be required for Physics major and honours programs, and will be a prerequisite for many upper-level physics courses.

2. Explain how the course learning outcomes align with the learning outcomes of the program(s) and contribute to students' ability to meet the [Institutional Learning Outcomes \(ILOs\)](#):

Students taking this course will be required to critically examine a variety of physics problems, identify the most important aspects of the problem, apply their knowledge of the appropriate areas of physics and mathematics, and effectively communicate their methods of solution to the instructor via assignment or tests.

Course Learning Outcome	Alignment with ILO
Utilize the techniques of dimensional analysis to check their solutions for errors	1,2,3
Prove various trigonometric identities using Euler's formula for complex numbers	1,2,3
Determine the eigenvalues and eigenvectors for a variety of different physical systems	1,2,3
Use index notation to simplify calculations involving vectors, including the derivation of certain vector identities	1,2,3
Apply the calculus of variations to solve the brachistochrone and other related problems	1,2,3
Calculate expectations of different quantities using statistical distributions	1,2,3
Perform a variety of calculations (including surface and volume integrals) using different coordinate systems	1,2,3
Distinguish the difference between exact and inexact differentials in terms of their relationship to partial derivatives	1,2,3

3. Will this course be required by any program beyond the discipline? If so, how will this course affect that program or programs?

No, this course will only be required for Physics students.

4. Which program areas have been consulted about the course?

As this course will generally be taken only by students in Physics programs, no other areas have been consulted.

5. If a new discipline designation is required, explain why:

N/A

6. In what ways does this course contribute to [Indigenizing Our Academy](#)? Provide explicit examples of assignment design, topic selection, curriculum delivery, or other methods, which can be in response to one or more of the following: [UFV Integrated Strategic Plan](#), [Fulfilling Our Commitment to Aboriginal Peoples policy \(BRP-200.05\)](#), the [TRC Calls to Action](#), and/or the [United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#).

This course contributes to Indigenizing Our Academy by integrating Indigenous teaching methods into its design, fostering inclusivity, and promoting reconciliation. An example of linking Indigenous knowledge with mathematical concepts involves the theoretical modeling of the flow of energy or distribution of resources (like water or heat) within a structure, which can improve natural heating, cooling, and ventilation — principles that many Indigenous buildings naturally incorporate. In addition, the course will use storytelling and collaborative learning to deliver the curriculum. Group work will be encouraged in preparation for quizzes and exams, and collaborative projects will be used as assessment methods, fostering a community-based approach to learning that reflects Indigenous values of collective knowledge-sharing and cooperation. This approach not only enriches students' academic experience, but also honors the diverse ways of knowing that are central to Indigenous cultures

7. How does the course reflect principles of [equity, diversity, and inclusion](#), through assignment design, topic selection, curriculum delivery, or other methods?

This physics course promotes equity, diversity, and inclusion by ensuring all students have equal access to the material and feel valued. The course design and teaching methods are gender agnostic, making the content accessible to everyone, and students are encouraged to share their perspectives respectfully. Assignments are varied, including group projects and individual work to accommodate different learning styles. Topics include contributions from diverse cultures to scientific principles ensuring the material is relevant to all. The course will use tailor-made problems to ensure content is inclusive, and collaborative learning helps students engage with each other's perspectives. Instructors create a safe environment, where respect and inclusivity are prioritized. By using Universal Design for Learning (UDL) principles and emphasizing the contributions of underrepresented groups, the course ensures every student has the opportunity to succeed in a supportive, inclusive setting.

8. If applicable, discuss any special considerations for this course (credit value, class size limit, frequency of offering, resources required such as labs or equipment, field trips, etc.):

N/A

9. Estimate of the typical costs for this course, including textbooks and other materials:

One of the listed textbooks (Riley, Hobson, and Bence) is currently priced around \$60, but in most cases instructors will likely not require students to purchase the book.



ORIGINAL COURSE IMPLEMENTATION DATE:
 REVISED COURSE IMPLEMENTATION DATE:
 COURSE TO BE REVIEWED (six years after UEC approval):
 Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PHYS 281		Number of Credits: 3 Course credit policy (105)													
Course Full Title: Theoretical Methods in Physics															
Course Short Title: (To be assigned by OReg based on university standards.)															
Faculty: Faculty of Applied and Technical Studies		Department/School: Physics													
Calendar Description: Students will be introduced to a variety of topics relevant to the study of the more theoretical aspects of Physics. These topics include: dimensional analysis, complex numbers, index notation, differentials and differential equations, coordinate systems and transformations, eigenvalues and eigenvectors, line, surface, and volume integrals, the calculus of variations, as well as some basic statistics. Note: Students with credit for MATH 281 cannot take this course for further credit.															
Prerequisites (or NONE):		PHYS 118 (or PHYS 112); and MATH 112 (or MATH 118)													
Corequisites (if applicable, or NONE):															
Pre/corequisites (if applicable, or NONE):															
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: MATH 281 Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>		Course Details Special Topics course: No <i>(If yes, the course will be offered under different letter designations representing different topics.)</i> Directed Study course: No <i>(See policy 207 for more information.)</i> Grading System: Letter grades Delivery Mode: Face-to-face only Expected frequency: Fall only Maximum enrolment (for information only): 24													
Typical Structure of Instructional Hours <table border="1"> <tr> <td>Lecture/seminar</td> <td>75</td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>[click to select]</td> <td></td> </tr> <tr> <td>Total hours</td> <td>75</td> </tr> </table>		Lecture/seminar	75	[click to select]		[click to select]		[click to select]		[click to select]		Total hours	75	Prior Learning Assessment and Recognition (PLAR) PLAR is available for this course.	
Lecture/seminar	75														
[click to select]															
[click to select]															
[click to select]															
[click to select]															
Total hours	75														
Scheduled Laboratory Hours Labs to be scheduled independent of lecture hours: [click to select]		Transfer Credit (<i>See bctransferguide.ca.</i>) Transfer credit already exists: No Submit outline for (re)articulation: Yes <i>(If yes, fill in transfer credit form.)</i>													
Department approval		Date of meeting: March 19, 2025													
Faculty Council approval		Date of meeting:													
Undergraduate Education Committee (UEC) approval		Date of meeting:													

Learning Outcomes (These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)

Upon successful completion of this course, students will be able to:

1. Utilize techniques of dimensional analysis to check their solutions for errors
2. Prove various trigonometric identities using Euler's formula for complex numbers
3. Determine the eigenvalues and eigenvectors for a variety of different physical systems
4. Use index notation to simplify calculations involving vectors, including the derivation of certain vector identities
5. Apply the calculus of variations to solve the brachistochrone and other related problems
6. Calculate expectations of different quantities using statistical distributions
7. Perform a variety of calculations (including surface and volume integrals) using different coordinate systems
8. Distinguish the difference between exact and inexact differentials in terms of their relationship to partial derivatives

Recommended Evaluation Methods and Weighting (Evaluation should align to learning outcomes.)

Assignments:	20%	Final exam:	40%	[click to select]	%
Quizzes/tests/midterm:	40%	[click to select]	%	[click to select]	%

Details:

(Provide a full assessment breakdown and any other relevant information.)

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.)

Lectures, assignments

Texts and Resource Materials (Include online resources and Indigenous knowledge sources. [Open Educational Resources](#) (OER) should be included whenever possible. If more space is required, use the [Supplemental Texts and Resource Materials form](#).)

Type	Author or description	Title and publication/access details	Year
1. Textbook	Riley, Hobson, and Bence	Mathematical Methods for Physics and Engineering	2006
2. Textbook	Arfken, Weber, and Harris	Mathematical Methods for Physicists	2012
3. Textbook	M. Boas	Mathematical Methods in the Physical Sciences	2005
4. [click to select]			
5. [click to select]			

Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)

Scientific calculator

Course Content and Topics

Exact course content may vary depending on the instructor, but students should expect to encounter the following topics:

1. Dimensional analysis - error checking, equation prediction
2. Complex numbers – Euler's formula, polar and Cartesian representations, trigonometric identities
3. Exact and inexact differentials – partial derivatives, Legendre transformations, applications to thermodynamics
4. Linear algebra – matrices, determinants, eigenvalues and eigenvectors
5. Index notation – Einstein summation convention, vector identities, coordinate transformations
6. Coordinate systems – Cartesian, spherical and cylindrical polar, scale factors, Jacobians
7. Line, surface, and volume integrals – applications to moments of inertia and continuous charge distributions
8. Calculus of variations – Fermat's principle, brachistochrone and tautochrone, simple geodesics, the Lagrangian
9. Basic statistics – discrete and continuous probability distributions, mean, variance, expectations
10. Solving simple ODE's – 1st and 2nd order, integration factors, applications to different branches of physics (time permitting)

UFV Transfer Credit Request Form

Course: PHYS 281 – Theoretical Methods in Physics

Code	Full Institution name	Transfer credit exists	Request transfer credit
ALEX	Alexander College	☐	☐
ASM	Acsenda School of Management	☐	☐
AU	Athabasca University	☐	☐
BCIT	BC Institute of Technology	☐	☐
CAMO	Camosun College	☐	☐
CAPU	Capilano University	☐	☐
CCC	Corpus Christi College	☐	☐
CMTN	Coast Mountain College	☐	☐
CNC	College of New Caledonia	☐	☐
COTR	College of the Rockies	☐	☐
COLU	Columbia College	☐	☐
COQU	Coquitlam College	☐	☐
DOUG	Douglas College	☐	☐
EC	Emily Carr University of Art & Design	☐	☐
FDU	Fairleigh Dickinson University	☐	☐
FIC	Fraser International College	☐	☐
JIBC	Justice Institute of BC	☐	☐
KPU	Kwantlen Polytechnic University	☐	☒
LANG	Langara College	☐	☐
LCV	LaSalle College Vancouver	☐	☐
NVIT	Nicola Valley Institute of Technology	☐	☐
NIC	North Island College	☐	☐
NLC	Northern Lights College	☐	☐
OC	Okanagan College	☐	☐
QU	Quest University	☐	☐
SELK	Selkirk College	☐	☐
SFU	Simon Fraser University	☐	☒
TRU	Thompson Rivers University	☐	☒
TWU	Trinity Western University	☐	☐
UBCO	University of British Columbia – Okanagan	☐	☒
UBCV	University of British Columbia – Vancouver	☐	☒
UCW	University Canada West	☐	☐
UNBC	University of Northern BC	☐	☒
UVIC	University of Victoria	☐	☒
VCC	Vancouver Community College	☐	☐
VIU	Vancouver Island University	☐	☒
YVU	Yorkville University	☐	☐

Visit <https://tcs.bctransferguide.ca/Web/Help/Detail/Upper-Level-Credit-Policy> for a list of institutions that will articulate upper-level courses.

For help identifying appropriate receiving institutions, see www.bccat.ca/pubs/resources/HowToArticulate2018.pdf.


ORIGINAL COURSE IMPLEMENTATION DATE:
REVISED COURSE IMPLEMENTATION DATE:
COURSE TO BE REVIEWED (six years after UEC approval):

Course outline form version: 06/18/2021

OFFICIAL UNDERGRADUATE CROSS-LISTED OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 281	Number of Credits: 3 Course credit policy (105)
Course Full Title: Theoretical Methods in Physics	
Course Short Title: (To be assigned by OReg based on university standards.)	
Faculty: Faculty of Science	Department (or program if no department): Math
Official Course Outline:	
This is a cross-listed course. Please refer to PHYS 281 for the official course outline.	
Calendar Description:	
Students will be introduced to a variety of topics relevant to the study of the more theoretical aspects of Physics. These topics include: dimensional analysis, complex numbers, index notation, differentials and differential equations, coordinate systems and transformations, eigenvalues and eigenvectors, line, surface, and volume integrals, the calculus of variations, as well as some basic statistics.	
Note: This course is offered as PHYS 281 and MATH 281. Students may take only one of these for credit.	
Prerequisites (or NONE):	PHYS 118 (or PHYS 112); and MATH 112 (or MATH 118)
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	
Antirequisite Courses (<i>Cannot be taken for additional credit.</i>) Former course code/number: Cross-listed with: Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>	Transfer Credit (See bctransferguide.ca) Transfer credit already exists: Click to select Submit outline for (re)articulation: [click to select] <i>(If yes, fill in transfer credit form.)</i>
Department / Program Head or Director: Jeff Chizma	Date approved:
Faculty Council approval	Date approved:
Undergraduate Education Committee (UEC) approval	Date of meeting:

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