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**MEMORANDUM**

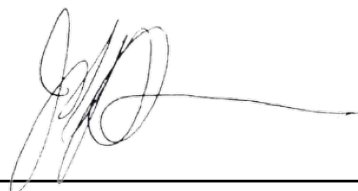
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**ATTENTION** Senate

**DATE** March 15, 2023

**FROM** Jeff Derksen,  
Chair of Senate Graduate Studies  
Committee (SGSC)

**RE:** New Courses




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**For information:**

Acting under delegated authority at its meeting of March 7, 2023, SGSC approved the following new course, effective **Fall 2023**:

**Beedie School of Business**

New course:

- 1) BUS 742: Leadership Retreat

**Faculty of Applied Science**

School of Computing Science

New course:

- 1) CMPT 722: Rendering and Visual Computing for Artificial Intelligence

School of Sustainable Energy Engineering

New courses:

- 1) SEE 810: Sustainability and Sustainable Energy Technologies
- 2) SEE 811: Technical Communication Skills

**Faculty of Science**

Department of Mathematics

New courses:

- 1) MATH 726: Probability
- 2) MATH 750: Introduction to Topology
- 3) MATH 775: Mathematical Data Science

Department of Molecular Biology and Biochemistry

New course:

- 1) MBB 778: Molecular Epidemiology of Infectious Disease



**Memo to SGSC**

**To: Senate Graduate Studies Committee**  
**From: Andrew Gemino, Associate Dean, Graduate Programs**  
**Re: BUS 742 Leadership Retreat**  
**Date: January 6<sup>th</sup> 2023**

The following curriculum revisions have been approved by the Beedie School of Business and are forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for **Fall 2023**.

Please include them on the next SGSC agenda.

- New Course: BUS 742 Leadership Retreat

The Beedie School of Business would like to create an optional course in the Full-Time MBA program titled: BUS 742 Leadership Retreat. During the retreat, students are offered a leadership framework that teaches students to lead from their strengths. This is an opportunity for leadership development that takes into account the diversity of our student group, reflecting on which leadership style suits each student, considering their unique background (e.g. gender, age, ethnicity, culture). As such, the program functions as a capstone for the leadership identity formation process that students go through during their MBA journey. They will leave the retreat having answered what their unique leadership strengths are. This process takes place in an outdoor setting which offers an opportunity to reflect on how their leadership style can be sustainable – taking care of others and the environment.

The retreat meets two important goals of SFU and of our Full-Time MBA program in particular: 1) develop authentic and sustainable leaders, 2) offer education from a diversity perspective, underscoring students' unique strengths. Students will have the option to enroll in this course in the final term of course work in lieu of BUS 723 Introduction to Managerial Thought. BUS 723 will continue to be a required course for anyone that does not choose to take the optional Leadership retreat.

The Full-Time MBA program successfully piloted an optional Leadership Retreat in August 2022 with 23 students. The experience was supported with the following resources:

- Experienced Leadership Instructors taught the course and supported students the entire experience
  - Dr. Hannes Leroy is a professor from the Rotterdam School of Management in the Netherlands. He led the course and his research focuses on developing authentic leadership. He has led leadership retreats for various business schools around the world.
- Leadership Coaches: Each group of students had a coach to help support their leadership journey and support student wellness during the activities.



- Outdoor Guides: Experienced local guides were carefully sourced to lead the groups of students on their hikes and ensure proper precautions were taken around routes, equipment needed and safety.
  - Worked with the Canada West Mountain School that has been established and vouched for since 1982. They are the longest hiking and backpacking guide service in BC. Their guides and instructors are certified through the Association of Canadian Mountain Guides (ACMG) and must adhere to the highest international standards for Mountain Guiding.
  - Instructors not only provided safety and guidance to students during the retreat but were available to help plan routes and guidance during the planning stages of their experiences.
  - Their services included safety and emergency equipment, instructional handouts as required, and pre-trip support.
  - The course offered a unique experience for students to use their own creativity in planning their expeditions while also being supported by the guides to ensure routes were safe, realistic, and attainable.
- Staff: 2 staff members joined the students throughout the experience and were prepared to appropriately respond and support various student situations. The staff went through multiple SFU training workshops in advance. Staff were also aware of all SFU resources available to students as well as the student code of conduct and contacts to follow up with if a situation arose. They also prepared a safety plan in advance and undertook First Aid training.

Prior to the Retreat, Beedie School of Business staff worked with SFU's Risk Services team to review the risk assessment, insurance and any paperwork needed such as liability waivers.

Quotes from student's that attended the pilot:

" I appreciated having the opportunity to build stronger relationships with my peers, and gain more insights from Hannes [the leadership faculty]. I feel that this was a great way to complete the MBA program!"

"Good opportunity to test our leadership capabilities in a challenging environment."

"It was a great trip and incites self-reflection."

"I hope that SFU continues to offer a leadership retreat in the future, and will provide SFU alumni with the opportunity to provide some form of participation as well!"

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.



**BEEIDIE SCHOOL  
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Segal Graduate School

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A handwritten signature in blue ink, appearing to read "AG", is written over a horizontal line.

Andrew Gemino  
Associate Dean, Graduate Programs, Beedie School of Business

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>BUS</b>	Number (eg. 810) <b>742</b>	Units (eg. 4) <b>2</b>
Course title (max. 100 characters) <b>Leadership Retreat</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Leadership Retreat</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description) <b>Through the Leadership Retreat, students develop their own leadership style by reflecting on their personal leadership strengths, gain understanding of others' strengths and weaknesses, learn how to lead diverse teams, and learn how to overcome set-backs and expand their comfort zone. Graded on a satisfactory/unsatisfactory basis</b>		
Rationale for introduction of this course <small>While some leadership knowledge is discovered in the classroom, research suggests that it takes confrontation, action, and reflection, to update the skills and behavioral patterns that help or hinder us in our leadership. The outdoor environment offers you all of that and is a great environment to accelerate the leadership development that otherwise takes years to grow. It should therefore come as no surprise that some call the outdoor setting the petri-dish of leadership development: removed from distractions, behavioral patterns are put under a microscope and the outdoor environment offers sufficient opportunity (contemplation, coaching, safe experimentation) to update those patterns</small>		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>Approximately 26 hrs for 3 days intensive course</b>	
Frequency of offerings/year <b>Annual</b>	Estimated enrollment per offering <b>60</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)		
Prerequisite and/or Corequisite		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Campus where course will be taught <input type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input checked="" type="checkbox"/> Off campus		
Course Components * <input type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input checked="" type="checkbox"/> FLD		
Grading Basis <input type="checkbox"/> Letter grades <input checked="" type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

\* See important definitions on the curriculum website.

## RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Dr. Lieke L. ten Brummelhuis</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course <b>Dr. Hannes Leroy</b>

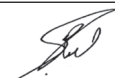
## CONTACT PERSON

Academic Unit / Program <b>Bus Grad Program</b>	Name (typically, Graduate Program Chair) <b>Agata Cibinska</b>	Email <b>busarcrd@sfu.ca</b>
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign


Graduate Program Committee	Signature	Date
Department Chair <b>Lieke L. ten Brummelhuis</b>	Signature 	Date <b>01/09/2023</b>

## FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Andrew Gemino</b>	Signature 	Date <b>01/09/2023</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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### ADMINISTRATIVE SECTION (for DGS office only)

Library Check: \_\_\_\_\_  
Course Attribute: \_\_\_\_\_  
Course Attribute Value: \_\_\_\_\_  
Instruction Mode: \_\_\_\_\_  
Attendance Type: \_\_\_\_\_

If different from regular units:  
Academic Progress Units: \_\_\_\_\_  
Financial Aid Progress Units: \_\_\_\_\_

## BUS 742: Leadership Retreat

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Instructor: Hannes Leroy and  
Lieke ten Brummelhuis

Semester: Summer 2024

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Email: [lttenbrum@sfu.ca](mailto:lttenbrum@sfu.ca)

Classroom: Segal and Offsite locations which  
include Cheakamus Centre and surrounding  
areas (Garibaldi Provincial Park)

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Phone: 778-782-4150

Office hours: by (Zoom) appointment

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### Course Description

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While some leadership knowledge is discovered in the classroom, research suggests that it takes confrontation, action, and reflection, to update the skills and behavioural patterns that help or hinder us in our leadership. The outdoor environment offers you all of that and is a great environment to accelerate the leadership development that otherwise takes years to grow. It should therefore come as no surprise that some call the outdoor setting the petri-dish of leadership development: removed from distractions, behavioural patterns are put under a microscope and the outdoor environment offers sufficient opportunity (contemplation, coaching, safe experimentation) to update those patterns.

In this 3-day optional course, we will travel to Squamish BC. We will stay for two nights in Cheakamus Centre, to prepare (day 1) and evaluate (day 3) the experience that you plan with your group on day 2. This experience can vary from low to extreme physical and emotional intensity. But all activities will relate to reflection on your MBA experience thus far, your leadership identity, and your unique path forward.

### Objectives

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The course objectives are built on a Personalized Leadership Trajectory (where every student is unique):

- **Awareness of your leadership challenges:** Students start their course work with a 360 assessment on the five main components (identity, task, relation, change, & ethics) and start the trajectory with a clear plan on how they intend to develop each of these. Throughout the trajectory, ample opportunities are provided for peer feedback and personal coaching for students to hone in on those areas that they want/need to work on.
- **Skill development to improve your leadership abilities:** Understanding their challenges, students and instructors then go on to create natural outdoor challenges that challenge the students in those areas that they need most development. These challenges are all related to their capacity to lead effectively inside and outside of the outdoor setting.
- **Build a strong leadership identity and corresponding narrative:** Having understood, worked through their personal challenges and updated their leadership toolbox, this course also places strong emphasis on the existing strengths that a person brings to the table. We see these strengths as the rough diamond (the unique, authentic way in which all of us have the capacity to lead) that this course intends to help sharpen (by polishing the rough, challenging edges).

Summarized we focus on the following content, skills, and attitudes:

	Mindfulness	Leadership & Teamwork	Coaching
Content	Basic understanding of research/theory supporting mindfulness.	Understanding of the basic four components of leadership (task, relation, change, and ethics) and the inherent tensions between them.	Understanding basic notions of mindful and active listening as well as appreciative inquiry and powerful questions.
Skills	Hands-on application of mindfulness during daily activities.	Applied skills in each content area, such as time management (task), perspective taking (relation), storytelling (change) and ethical reasoning (moral)	We teach students how to paraphrase, summarize, observe behavioural patterns, and formulate questions that are impactful.
Attitude	The mindset to be able disconnect from an automatic mode of being to a more aware state of being.	The leadership and followership identity of knowing that your words and actions impact others and switching this off.	Leadership not through direction but through facilitation.

## Course Background

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Leadership has been given many names. If we count the leadership styles that have been proposed by gurus and add the variety of approaches suggested by as many consultants, it is very easy to forget that there is a forest behind all these trees. If we put all these approaches in the scientific blender, the four main topics listed below emerge (Yukl, 2010). In covering these four content-buckets, we strive to provide a well-rounded leadership development. Please note how these buckets build on each other (and will therefore be dealt with in a stepwise manner): for instance, it is hard to start talking about moral dilemmas if you have trouble getting things done.

- **Task:** do you have what it takes to *get things done*?
- **Relation:** are you able to *connect successfully* with others?
- **Change:** are your able to *deal with complexity*?
- **Ethics:** are you *aware of your impact*?

## Teaching Methods

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Teaching for this course is very hands-on. Because every person is unique and every outdoor challenge is unique, there is little in terms of standardized format in which challenges present themselves. Ensuring safety first and foremost, we follow these guiding principles:

- 1) **Personal challenges:** Students will decide on the activity they choose which ranges from meditation to a challenging hike. On day 3, there will be time/opportunity to debrief the day's events and lessons learned and discuss the challenges for the future (e.g., experiences at work). The challenges will follow the four buckets, building on each other: task, relation, change, and ethics.
- 2) **Leading yourself and others:** Everyone will receive ample opportunity to lead, follow, and share leadership. Throughout the course instructors will increasingly (depending on the skillset of the followers, ensuring safety at all costs) distance themselves from the actual goal to instead focus on coaching and supporting personal growth. Students will not only be coached, but throughout the trajectory will receive the skills to coach each other. These coaching skills are an effective ingredient to the capacity to lead effectively and we see this as the culmination of experience throughout the trajectory: first you learn how to lead, second you learn how to follow, third you learn how to share leadership, and fourth you learn how to coach others how to lead themselves.
- 3) **Mindfulness:** A final ingredient of this course is mindfulness. Although one possibility, you do not have to meditate. The outdoor setting and hikes provide ample attitude for students to engage in mindfulness in a very natural way. Instructors will gradually introduce students to the basic principles of this ancient, scientifically tested technique. We see mindfulness not as an end goal but as a catalyst: mindfulness enhances the likelihood that learning occurs.

## Course workload

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The course workload is the equivalent of 2 ECTS (1 ECTS = 28 hours) = 56 hours, distributed as follows:

Pre-expedition sessions and preparation:	14 hours
Expedition:	36 hours (3 days, 12 hours per day)
Individual assignment:	6 hours (3 hours problem, 3 hours solution)
Total:	56 hours

## Logistics

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A mandatory supplementary fee (MSF) will be attached to this course. The fee for this course is \$1200 CAD. SFU organizes transport from downtown Vancouver to Cheakamus Centre on Day 1 and back to Vancouver on Day 3. Students take care of their own equipment (e.g., hiking shoes, backpack) for the trip - as many have their own equipment or want to borrow from a friend.

## Book and Materials

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TBD

## Learning and Assessments

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### Assessment summary

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Evaluation in the course will be based on a combination of group and individual work.

<b>Individual</b>	360-degree feedback	In class pre-trip	10%
	Case 1 - Task	In class pre-trip	15%
	Case 2 - Relation	In class pre-trip	15%
	Case 3 - Change	In class pre-trip	15%
	Case 4 - Ethics	In class pre-trip	15%
	Legacy Speech	During trip	10%
	In-course progress	During trip	20%
	<b>Total</b>		<b>100%</b>

### 360-Degree Feedback

**Due: TBA**

To personalize your leadership journey, we are asking you to complete a [360 survey](#) (e-mailed to you approximately one month before the retreat). This is not your traditional 360 survey: we ask people who know you really well (friends, family, ... ) some personal questions to aid you in your development. Using this feedback, at the expedition, you will receive one letter per day from the home-front.

### Cases - Problem

**Due: TBA**

After the introduction day, students complete a case (around 1 page - single spaced or 500 words) per topic. This is a personal case that describes one or more leadership challenges that you expect to encounter on this course. This case should not be finished (with a solution) but reflect a real and unfinished problem that you are still wrestling with and hope to solve during the expedition. These first drafts of the problem cases (4 in total) are due before the course start date, to be handed in through Canvas). These will be shared with all instructors to help them tailor the expedition to better serve your developmental needs.

### Final Cases – Problem and Solution

**Due: TBA**

After the course, we ask students to work on the solution to their problems. The solution will reflect a concrete plan of action for each of the problems identified before the course. We expect students to hand in their problems and solutions on date tbd through Canvas. In total, this will be around 8 pages, single space, or 1000 words per topic (task, relation, change, and ethics). This means that, in

total, at the end of the course, I will receive four two-page cases on the class topics, reflecting both problem case (500 words) and solution (500 words). Cases will be graded and more important than a perfect problem and solution is the progress that students have made over the course. For instance, we expect that some students will alter their problem statement further based on the solution they have developed.

The cases will be graded with this rubric:

Case:	Criteria:
<b>Writing – Lay-out micro &amp; macro structure;</b>	<ul style="list-style-type: none"> <li>○ Went above and beyond to attract and retain the attention of the reader = 3</li> <li>○ Well-structured piece, good but not strong = 2</li> <li>○ Writing/format issues detract strongly from overall impression = 1</li> </ul>
<b>Evidence of Reflection; Quality of arguments</b>	<ul style="list-style-type: none"> <li>○ Clear arguments with a logical compelling build-up = 3</li> <li>○ Clear arguments but somewhat disconnected = 2</li> <li>○ Incoherent arguments that are only remotely connected = 1</li> </ul>
<b>Authenticity, Making it personal</b>	<ul style="list-style-type: none"> <li>○ Makes specific suggestions on how to improve the situation = 3</li> <li>○ Highlights their strengths/weaknesses in the analysis of the problem = 2</li> <li>○ Offers a personal case study with clear room for improvement = 1</li> </ul>

### Legacy Speech

**Due: TBA**

On day 3 of the retreat, all students will perform a Legacy Speech as the end goal of this course. This speech will be graded on clarity (structure, build-up, key-points, ...), authenticity (does this person present themselves as professional yet authentic?), and credibility (would you invest 1000 dollars in this person – what was missing?). Students will receive the tools to build this speech before day 3 of the retreat.

### Course Schedule

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Pre-Retreat	Pre-Expedition Workshops: dates TBA	
	Topic 1	<b>Introduction to Outdoor Leadership Development</b>
	Case:	Gates of the Artic (no preparation needed)
	Topic 2	<b>Practical Consideration</b>
	Exercise:	Making a plan

Prepare Day	Day 1	
	8:00 AM	<b>Travel to Cheakamus</b>
	9:30 AM	Charter arrives at Cheakamus + put gear away in cabins
	10:30 AM	Activity 1 – Who are you
	12:00 PM	Lunch
	1:00 PM	Activity 2 – How life has shaped you.
	2:30 PM	Activity 3 – Begin with the end in mind.
	4:00 PM	Activity 4 – What leadership strengths do you bring?
	5:30 PM	Dinner
	7:00 PM	Free time
	11:00 PM	Curfew

Experience Day	Day 2	
	TBD	Expeditions begin (start time will depend on your group's plan)
	7:00 PM	Dinner
	8:00 PM	Campfire + smores

	11:00 PM	Curfew
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Post-Experience Day	Day 3	
	8:00 AM	Breakfast
	Topic 1	Legacy Speeches
	Exercise:	What kind of leader will you be?
	12:00 PM	Lunch
	Topic 2	Sharing and Remembering (lessons learned)
	4:00 PM	Travel to Vancouver

### **Inclusiveness and Accommodations**

Read the [Diversity and Inclusion Community Guidelines](#) and operate from these guidelines while in class, tutorials and any team meetings outside class

All of us have different access needs; some of these may be readily apparent, while others may not. Each student is equally important to the success of the course, so we will work together to make sure that everyone can participate. We want all students to have the opportunity to perform at their highest potential. If a student has a disability and/or may require accommodations, please notify the Centre for Accessible Learning (<https://www.sfu.ca/students/accessible-learning.html>) as soon as possible. The Centre for Accessible Learning exists to ensure that fair and reasonable accommodations are made for students who need them.

### **Academic Integrity - General**

Plagiarism is the unacknowledged use of other people's ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university's strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to contribute comments and write reports and assignments in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

SFU's Academic Integrity web site <http://www.sfu.ca/students/academicintegrity.html> is filled with more elaborate information on what is meant by academic dishonesty, where you can find resources to help with your studies and the consequences of cheating. Check out the site for more information and videos that help explain the issues in plain English.

Each student is responsible for his or her conduct as it affects the University community. Academic dishonesty, in whatever form, is ultimately destructive of the values of the University. Furthermore, it is unfair and discouraging to the majority of students who pursue their studies honestly. Scholarly integrity is required of all members of the University. <http://www.sfu.ca/policies/gazette/student/s10-01.html>

ACADEMIC INTEGRITY: YOUR WORK, YOUR SUCCESS

### About the Course Instructors

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**Dr. Lieke L. ten Brummelhuis** is an Associate Professor of Management and Organizations at the Beedie School of Business, Simon Fraser University. Lieke has taught courses in Organizational Behavior, Social Policy Design, and Teamwork. She is frequently invited by organizations and media to speak about topics including stress, work-life balance and workaholism.

Lieke received her PhD in organizational sociology from Utrecht University in the Netherlands. Prior to joining the faculty at Beedie, she was a visiting scholar at University of Pennsylvania's Wharton School. Lieke's research interests cover topics related to employee well-being including employee recovery, workaholism, work-life balance, and flexible work designs. More specifically, she is motivated to find an answer to the question of *why people work in the way they work, and if there are better work style to improve work outcomes, work-life balance, and eventually well-being*. Her work has been published in academic journals such as Academy of Management Discoveries, American Psychologist, Journal of Applied Psychology, Organizational Behavior and Human Decision

Processes, Journal of Management, and Journal of Organizational Behavior as well as popular scientific outlets such as Harvard Business Review.

<https://beedie.sfu.ca/profiles/LieketenBrummelhuis> .

### **Dr. Hannes Leroy**

As Academic Director of the Erasmus Center of Leadership, Hannes helps to oversee the quality of leadership development at different levels in Erasmus University (undergraduate, graduate, post-graduate, and executive education). Furthermore, as steward of the League of Leadership initiative he helps to oversee an international consortium of top business schools across the world with the mission of collectively enhancing quality standards of leadership development. Aligned with these efforts, Hannes has published numerous studies on leadership and its development in top journals, has taught a wide variety of leadership classes and is principal coordinator of various leadership development curricula.

<https://www.rsm.nl/people/hannes-leroy/>

MEMORANDUM

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Attention Dr. Jeff Derksen  
Dean, Graduate Studies

Date: Feb 22, 2023

From Dr. Parvaneh Saeedi [psaeedi@sfu.ca](mailto:psaeedi@sfu.ca)  
Faculty of Applied Science, Graduate Studies Committee

Re: FAS-CMPT 722- Rendering and Visual Computing for Artificial Intelligence

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The faculty of Applied Sciences Graduate Studies Committee would like to propose a new graduate course at the School of Computing Science effective Fall 2023 CMPT 722 - Rendering and Visual Computing for Artificial Intelligence.

This course covers advanced computer graphics topics, focusing on rendering and computer graphics for virtual/augmented reality and artificial intelligence systems. It will be a modernization of “CMPT 761 Image Synthesis,” combining traditional topics in photorealistic rendering with coverage of neural rendering, differentiable rendering, and inverse rendering. CMPT 761 number was previously used in 2013-2016, but the old course was withdrawn.

Regards,  
Parvaneh Saeedi







MEMO

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Tel: 778-782-4277  
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Web: www.cs.sfu.ca

ATTENTION	Parvaneh Saeedi, Associate Director
FROM	Igor Shinkar, Graduate Program Director
RE	New Course Proposal – CMPT 722
DATE	February 7, 2023

**COURSE PROPOSAL CMPT 722 - Effective Spring 2024**

CMPT 722 - Rendering and Visual Computing for Artificial Intelligence

The School of Computing Science is proposing a new graduate course effective Fall 2023 – CMPT 722 Rendering and Visual Computing for Artificial Intelligence.

The course cover advanced topics in computer graphics with a focus on rendering, and computer graphics for virtual/augmented reality and artificial intelligence systems. It will be a modernization of “CMPT 761 Image Synthesis” combining traditional topics in photorealistic rendering with coverage of neural rendering, differentiable rendering and inverse rendering. CMPT 761 number previously used in 2013-2016 but old course was withdrawn.

If you have any questions, please let me know.

Igor Shinkar,  
Graduate Chair, School of Computing Science

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>CMPT</b>	Number (eg. 810) <b>722</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Rendering and Visual Computing for Artificial Intelligence</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Rendering &amp; VC for AI</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description - max. 50 words) <b>Advanced topics in computer graphics with a focus on rendering, and computer graphics for virtual/augmented reality and artificial intelligence systems. Topics include photorealistic rendering; advanced ray tracing; light fields and volume rendering; differentiable and inverse rendering; neural rendering; and high-performance architectures for visual computing systems.</b>		
Rationale for introduction of this course <b>Rendering is increasingly used in domains such as augmented reality and artificial intelligence. This course combines traditional topics in photorealistic rendering with coverage of neural rendering, differentiable rendering and inverse rendering and their use for AI systems.</b>		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings/year <b>1</b>	Estimated enrollment per offering <b>40</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>None</b>		
Prerequisite and/or Corequisite <b>CMPT 361 or equivalent and CMPT 726</b>		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/>		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

\* See important definitions on the curriculum website.

## RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Manolis Savva, Andrea Tagliasacchi, Richard Zhang, Yasu Furukawa</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course

## CONTACT PERSON

Academic Unit / Program <b>CMPT</b>	Name (typically, Graduate Program Chair) <b>Igor Shinkar</b>	Email <b>ishinkar@sfu.ca</b>
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign


Graduate Program Committee <b>Igor Shinkar</b>	Signature 	Date <b>Feb 7, 2023</b>
Department Chair <b>Mohamed Hefeeda</b>	Signature 	Date <b>Feb 7, 2023</b>

## FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Parvaneh Saeedi</b>	Signature 	Date <b>Feb 22, 2023</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee	Signature	Date
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### ADMINISTRATIVE SECTION (for DGS office only)

Library Check: \_\_\_\_\_  
 Course Attribute: \_\_\_\_\_  
 Course Attribute Value: \_\_\_\_\_  
 Instruction Mode: \_\_\_\_\_  
 Attendance Type: \_\_\_\_\_

If different from regular units:  
 Academic Progress Units: \_\_\_\_\_  
 Financial Aid Progress Units: \_\_\_\_\_

# CMPT 722: Rendering and Visual Computing for Artificial Intelligence

Advanced topics in computer graphics with a focus on rendering, and computer graphics for virtual/augmented reality and artificial intelligence systems. Topics include photorealistic rendering; advanced ray tracing; light fields and volume rendering; differentiable and inverse rendering; neural rendering; and high-performance architectures for visual computing systems.

Prerequisites: CMPT 361 and CMPT 726

## Learning goals

- Understand the fundamentals of advanced rendering algorithms and their use in domains such as augmented/virtual reality, machine learning, and artificial intelligence
- Experience reading, summarising, and critiquing research papers on rendering and visual computing for AI
- Practice synthesising ideas from papers and connecting to own research
- Expand in-depth knowledge of rendering or image generation through a self-selected course project

## Weekly schedule template

**W1: Graphics fundamentals review:** rasterization, ray tracing, spatial acceleration, modelling, transformations, shading, textures, real-time graphics systems & GPU pipelines

**W2: 3D representations review:** implicit vs explicit, Brep vs Vrep, pointclouds, meshes, multiview, voxels, fields

**W3: Modelling 3D shapes & scenes:** hierarchical representations, scene graphs, level-of-detail algorithms

**W4-5: Rendering fundamentals:** radiometry & photometry, BRDFs, lightfields

**W6-7: Path tracing:** rendering equation preliminaries, Monte carlo integration, volume rendering, path tracing

**W8: Differentiable rendering:** automatic differentiation, inverse & differentiable rendering, applications

**W9: Neural rendering:** image-based rendering, neural fields primer, neural rendering architectures

**W10: Synthetic data:** data generation for machine learning & AI applications

**W11: 3D scene generation:** 3D generative models overview, floorplans, layouts, shapes, scenes

**W12: Graphics for AI:** graphics for embodied AI, high-performance & batched rendering systems

## Grading

Grading based on written assignments, programming assignments, paper presentations, and a course project.

Grading breakdown:

- 20% Paper reading & summaries
- 20% Programming assignments
- 20% Paper presentations & discussions
- 40% Course project

## Material

- Physically Based Rendering: From Theory to Implementation 4th edition [[Pharr, Jakob, Humphreys](#)]

MEMORANDUM

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Attention Dr. Jeff Derksen  
Dean, Graduate Studies

Date: Feb 02, 2023

From Dr. Parvaneh Saeedi, [psaeedi@sfu.ca](mailto:psaeedi@sfu.ca)  
Faculty of Applied Science, Graduate Studies Committee

Re: FAS-SEE Program change

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The faculty of Applied Sciences Graduate Studies Committee would like to propose the following changes to the School of Sustainable Energy Engineering's Masters and PhD programs:

1. A new course SEE 810 (Sustainability and Sustainable Energy Technologies) is proposed that fulfills the need for a core course on Sustainable Energy. This will be part of the mandatory requirement for MASc and optional for the PhD students.
2. A new course SEE 811 (Technical Communication Skills) is proposed that fulfills the need for a technical communication skills course taken by all MASc and PhD students.
3. ~~A calendar entry change request to add SEE 810 to the list of mandatory courses articulated in the SEE MASc program requirements and add SEE 811 to the list of mandatory courses articulated in the SEE MASc and SEE PhD programs.~~

The rationale for these additions is that adding SEE 810 and SEE 811 will ensure that students have a suitable foundation in the concepts of sustainable energy and technical communications.

4. ~~We also request to change the scope of courses SEE 896 and SEE 897 as previously articulated in the SEE MASc and PhD program requirements, respectively. This will remove the publication and presentation skills component of the course and reduce the duration to 1hr/week.~~

~~The scope of SEE 896 and SEE 897 will narrow down by focusing on traditional graduate seminar components, and instead require separate courses to build on technical and communication skills.~~

We request for the changes to appear in the SEE calendar for Fall 2023.

Regards,  
Parvaneh Saeedi





5118 - 10285 University Drive  
Surrey, BC, Canada V5A 1S6

TEL: 778-782-7038  
FAX: 778-782-5802

fas\_sry\_admin@sfu.ca  
www.sfu.ca/see

MEMORANDUM

ATTENTION Associate Dean Research and Grad Studies, Faculty of Applied Sciences DATE 30 Jan 2023

FROM Dr. Colin Copeland, Graduate Program Chair, School of Sustainable Energy Engineering PAGES 1

RE: Creation of SEE 810 and SEE 811 new courses  
~~Changes to SEE 896 and SEE 897 courses~~  
~~SEE calendar entry to update the requirements for MASC and PhD programs~~

This memo is ~~to accompany some changes to the SEE MASC and PhD programs as follows:~~

A new course SEE 810 is proposed that fulfills the need for a core course on Sustainable Energy. This will be part of the mandatory requirement for MASC and optional for the PhD students.

A new course SEE 811 is proposed that fulfills the need for a technical communication skills course taken by all MASC and PhD students.

~~A calendar entry change request to add SEE 810 to the list of mandatory courses articulated in the SEE MASC program requirements and add SEE 811 to the list of mandatory courses articulated in the SEE MASC and SEE PhD programs.~~

~~We also request to change the scope of courses SEE 896 and SEE 897 as previously articulated in the SEE MASC and PhD program requirements, respectively. This will remove the publication and presentation skills component of the course and reduce the duration to 1hr/week.~~

These changes are all anticipated to appear in the SEE calendar for Fall 2023.

The rationale for these additions is that adding SEE 810 and SEE 811 will ensure that students have a suitable foundation in the concepts of sustainable energy and technical communications. ~~The scope of SEE 896 and SEE 897 will narrow by focusing on traditional graduate seminar components, and instead require separate courses to build on technical and communication skills.~~

Colin Copeland

SEE Graduate Program Committee Chair

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>SEE</b>	Number (eg. 810) <b>810</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Sustainability and Sustainable Energy Technologies</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Sustainable Energy Foundations</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description) Examines the core concepts of sustainability for graduate students in the School of Sustainable Energy Engineering (SEE). Principles of sustainability and the role of technology in addressing critical challenges relating to society's use of energy are discussed. Specific topics will include technologies for low-impact/renewable electrical energy generation, distribution, and utilization in stationary and mobile applications. It is required for students in the SEE MASc program and is optional for students in the SEE PhD program.		
Rationale for introduction of this course This will become a core course for students in the SEE MASc program and an optional course for students in the SEE PhD program. The SEE graduate program recruits from a broad range of engineering disciplines. As a result, it is important to ensure that all students have an in-depth foundation of the concepts of sustainable energy engineering to accompany their specialist expertise from their research thesis and technical electives.		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) 4 hrs/wk (3 hrs/wk lecture + 1 hr/wk tutorial) for 13 weeks	
Frequency of offerings/year <b>1</b>	Estimated enrollment per offering <b>20</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>None</b>		
Prerequisite and/or Corequisite Open to SEE MASc students or permission of the Graduate Program Chair. Co-requisites: SEE896 (MASc) or SEE897 (PhD)		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite	Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Campus where course will be taught <input type="checkbox"/> Burnaby <input checked="" type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input checked="" type="checkbox"/> Tutorial		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

\* See important definitions on the curriculum website.

**RESOURCES**

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Faculty member from the SEE faculty complement</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course None. The course will be taught by an individual faculty member from the SEE faculty complement. The content will be sufficiently general that most SEE faculty will be able to deliver the course. As it replaces a technical elective for student's degree program, it will have no impact on net teaching workload in SEE.



**CONTACT PERSON**

Academic Unit / Program <b>Sustainable Energy Engineering</b>	Name (typically, Graduate Program Chair) <b>Colin Copeland</b>	Email <b>colin_copeland@sfu.ca</b>
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**ACADEMIC UNIT APPROVAL**

A course outline must be included.

Non-departmentalized faculties need not sign

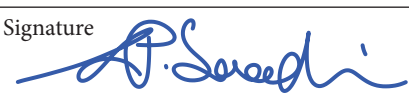
Graduate Program Committee <b>Colin Copeland</b>	Signature 	Date 2023-01-30
Department Chair <b>Mehran Ahmadi</b>	Signature 	Date January 30, 2023

**FACULTY APPROVAL**

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>P. Saeedi</b>	Signature 	Date <b>Feb 2, 2023</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

**SENATE GRADUATE STUDIES COMMITTEE APPROVAL**

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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ADMINISTRATIVE SECTION (for DGS office only) Library Check: _____ Course Attribute: _____ Course Attribute Value: _____ Instruction Mode: _____ Attendance Type: _____	If different from regular units: Academic Progress Units: _____ Financial Aid Progress Units: _____
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## School of Sustainable Energy Engineering

### SEE 810 – Sustainability and Sustainable Energy Technologies

Units: 3  
Lecture hours: 39

#### **Course Description**

An introduction to the core concepts of sustainability for graduate students in the School of Sustainable Energy Engineering (SEE). The course will introduce sustainability and the role of technology in addressing critical challenges relating to society's use of energy. Topics will include technologies for low-impact/renewable electrical energy generation, distribution, and utilization in stationary and mobile applications. The course is only open to graduate students in a thesis-based program in SEE. It is required for students in the SEE MASc program and is optional for students in the SEE PhD program.

#### **Topics Covered**

- Exploring complexity of sustainability concepts, including the UN SDGs
- Global energy flows, environmental and societal impacts
- Technologies for sustainable energy harvesting, storage and transmission
- End uses of energy and strategies for energy conservation
- Energy conversion technologies and service delivery

#### **Course Organization**

The course will be delivered as a lecture/tutorial style and will include group and self-directed learning components. For the course project, the students will work in small groups to explore the drivers and barriers to improving the sustainability of a specific technological application within a major energy system.

#### **Course Learning Outcomes**

At the end of this course, students are expected to be able to:

1. Define different viewpoints on the meaning of sustainability and express these views in the context of energy systems;
2. Explain the primary sources, carriers, and end-uses of energy in modern society;
3. Identify and quantify the main energy losses/inefficiencies and environmental impacts of energy technologies; and
4. Evaluate a specific energy technology from multiple viewpoints including economic, environmental, and societal implications.

#### **Indicative Grading Scheme (subject to change)**

- Class Discussions: 20%
- Mid-term examination: 30%
- Major project: 50%

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>SEE</b>	Number (eg. 810) <b>811</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Technical Communication Skills</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Technical Communication Skills</b>		
<p>Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as “This course will...” or “The purpose of this course is...” If the grading basis is satisfactory/unsatisfactory include this in the description)</p> <p>Communication skills, knowledge and strategies to support successful graduate student research in engineering including communicating clearly and concisely with interdisciplinary, technical, and non-technical audiences. Students will learn to identify areas for investigation, propose a writing project, source relevant and reliable literature, use an intentional writing process, address rhetorical issues of audience, purpose and style, and practice constructive, analytical and empowering peer review. A special emphasis will be communicating with policy audiences. Students will practice clear, concise, and impactful professional presentations for interdisciplinary audiences.</p>		
<p>Rationale for introduction of this course</p> <p>This will become a core course for students in the SEE MASc &amp; PhD programs. The SEE graduate program recruits from a broad range of engineering disciplines. As a result, it is important to ensure that all students have a suitable foundation in the concepts of technical communications. The SEE graduate program recruits from a broad range of engineering disciplines. As a result, it is important to ensure that all students have a suitable foundation in the concepts of technical communications.</p>		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) 4 hrs/wk (3 hrs/wk lecture + 1 hr/wk tutorial) for 13 weeks	
Frequency of offerings/year <b>1</b>	Estimated enrollment per offering <b>25-30</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)		
Prerequisite and/or Corequisite		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input type="checkbox"/> Burnaby <input checked="" type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input checked="" type="checkbox"/> Tutorial		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

\* See important definitions on the curriculum website.

**RESOURCES**

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Faculty member from the SEE faculty complement</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course None. The course will be taught by an individual faculty member from the SEE faculty complement. The content is sufficiently generic that most SEE faculty are be able to deliver the course.



**CONTACT PERSON**

Academic Unit / Program <b>Sustainable Energy Engineering</b>	Name (typically, Graduate Program Chair) <b>Colin Copeland</b>	Email <b>colin_copeland@sfu.ca</b>
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**ACADEMIC UNIT APPROVAL**

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee <b>Colin Copeland</b>	Signature 	Date 2023-01-30
Department Chair <b>Mehran Ahmadi</b>	Signature 	Date January 30, 2023

**FACULTY APPROVAL**

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>P. Saeedi</b>	Signature 	Date <b>Feb 2, 2023</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

**SENATE GRADUATE STUDIES COMMITTEE APPROVAL**

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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ADMINISTRATIVE SECTION (for DGS office only) Library Check: _____ Course Attribute: _____ Course Attribute Value: _____ Instruction Mode: _____ Attendance Type: _____	If different from regular units: Academic Progress Units: _____ Financial Aid Progress Units: _____
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## **School of Sustainable Energy Engineering**

### **SEE 811 – Technical Communication Skills**

Units: 3

Lecture hours: 39

#### **Course Description**

Imparting critical technical communication skills that are essential for success in the SEE graduate program. The focus is on understanding multidisciplinary, technical, or non-technical audiences and communicating with them clearly and concisely; there is a special emphasis on effectively communicating with policy audiences. Students get a hands-on experience in conducting literature review, and developing and writing research proposals, technical reports, and journal/conference papers. Tips for writing successful grant applications, coupled with practical examples, are shared in the classroom. Students also learn to make clear, concise, and impactful professional presentations to multiple audiences.

#### **Topics Covered**

- Identifying and communicating with a range of technical and non-technical audiences
- Unique ways of communicating with policy audiences
- Writing in different formats – papers, reports, proposals, grant applications
- Success in grant applications
- Making impactful presentations

#### **Course Organization**

The course will be delivered through interactive lectures, combined with in-class dialogue, group activities, and oral presentations. It will provide guidance for self-directed learning and encourage students to bring in their own research outputs, facilitating completion of their respective research deliverables. Students are expected to undertake peer-review evaluation of class assignments and provide feedback to their classmates.

#### **Course Learning Outcomes**

At the end of this course, students are expected to be able to:

1. Develop communication strategies that work for specific, targeted audiences;
2. Write effectively in a number of different formats, including the ability to evaluate and revise their own documents;
3. Make effective and impactful oral presentation, including design of visuals;
4. Understand donor requirements and tailor grant applications to meet those requirements; and
5. Effectively communicate with policy audiences.

#### **Indicative Grading Scheme (subject to change)**

- Interactive class discussions: 30%
- Pop quizzes (5): 15%
- Written assignments (4): 30%
- Final presentation: 25%



**MEMO**

**Faculty of  
Science**

ATTENTION: Senate Graduate Studies Committee

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FROM: Vance Williams, Associate Dean Graduate Studies,  
Faculty of Science

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RE: Proposed Course Changes and Additions for Fall 2023,  
Faculty of Science

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DATE: December 7, 2022

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Dear SGSC,

The following curriculum changes have been approved by the Faculty of Science and are being submitted to the Senate Graduate Studies committee for approval.

The following new courses are being proposed:

**MATH 726** Probability

**MATH 750** Introduction to Topology

**MATH 775** Mathematical Topics in Data Science

Enclosed are the documents in support of these changes.

Sincerely,

A handwritten signature in blue ink that reads "Vance Williams".

---

Vance Williams  
Associate Dean Graduate Studies, Faculty of Science

To: Dr. Vance Williams, Associate Dean, Graduate Studies, Faculty of Science,  
SFU

From: Petr Lisonek, Graduate Program Chair, Mathematics

Re: New courses MATH 726, 750, 775

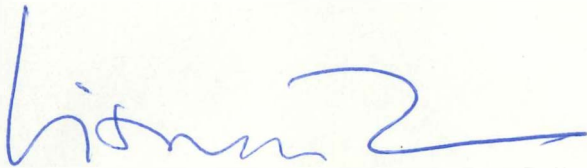
Date: 28 October 2022

The following new courses have been approved by the Department of Mathematics and are forwarded to the Faculty of Science for approval. These curriculum items should be effective for Fall 2023. Please include them on the next SGSC agenda.

All three courses are cross-listed with corresponding undergraduate courses (MATH 426, MATH 450, MATH 475) that already exist in SFU Calendar. Extra requirements for students registered in the proposed graduate courses are listed in the forms.

***Department of Mathematics***

*New courses: MATH 726, 750, 775*



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Petr Lisonek, Graduate Program Chair, Mathematics

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>MATH</b>	Number (eg. 810) <b>726</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Probability</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Probability</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as “This course will...” or “The purpose of this course is...” If the grading basis is satisfactory/unsatisfactory include this in the description) <b>A study of probability from the rigorous point of view. Topics include: random variables, generating functions, convergence of random variables, the strong law of large numbers and the central limit theorem, stochastic processes, stationary processes, and martingales.</b>		
Rationale for introduction of this course 1) To increase the number of graduate-level offerings in probability - an area of high demand amongst our students. 2) To be consistent with our other 400-level undergraduate courses, which are paired with 700-level courses.		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings/year <b>once every two years</b>	Estimated enrollment per offering <b>5</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>MATH 426 (two way)</b>		
Prerequisite and/or Corequisite <b>None</b>		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/> _____		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students: <b>MATH 426. Students in MATH 726 will complete additional coursework, which may include a combination of additional homework problems, a project or extra exam questions</b>		

\* See important definitions on the curriculum website.

## RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Ben Adcock, Caroline Colijn, Dave Muraki, Nilima Nigam, and Paul Tupper.</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course <b>None.</b>



## CONTACT PERSON

Academic Unit / Program <b>Mathematics</b>	Name (typically, Graduate Program Chair) <b>Ben Adcock</b>	Email <b>ben_adcock@sfu.ca</b>
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign


Graduate Program Committee <b>Petr Lisonek</b>	Signature 	Date <b>19 Oct 2022</b>
Department Chair <b>Manfred Trummer</b>	Signature 	Date <b>19 Oct 2022</b>

## FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Vance Williams</b>	Signature 	Date <b>November 30, 2022</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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### ADMINISTRATIVE SECTION (for DGS office only)

Library Check: \_\_\_\_\_  
 Course Attribute: \_\_\_\_\_  
 Course Attribute Value: \_\_\_\_\_  
 Instruction Mode: \_\_\_\_\_  
 Attendance Type: \_\_\_\_\_

If different from regular units:  
 Academic Progress Units: \_\_\_\_\_  
 Financial Aid Progress Units: \_\_\_\_\_



Department of Mathematics, Simon Fraser University  
**Outline: MATH 726 Probability**

**Grading Scheme:**

- Assignments 50%
- Midterm 20%
- Final Exam 30%

This course is held in conjunction with MATH 426. Students in MATH 726 will complete additional (or alternative) exercises, both in the assignments and the examinations.

**Calendar Description:** A study of probability from the rigorous point of view. Topics include: random variables, generating functions, convergence of random variables, the strong law of large numbers and the central limit theorem, stochastic processes, stationary processes, and martingales.

**Course Overview:** In this course students will study the theory of probability. Students are expected to already have some working familiarity with the basics of probabilistic reasoning before taking the course. Building on this foundation, we start with the formal definition of a probability space, and continue on to the definition of random variables and eventually to stochastic processes. Topics will be covered through alternately the formal development of the theory and the working through of various examples. Coursework will likewise involve a combination of demonstrating an understanding of the definitions, theorems, and proofs of probability theory, as well as working through properties of examples and applications to numerous fields.

**Required Reading and Outline:**

*Probability and Random Processes* by Geoffrey Grimmett and David Stirzaker, Oxford University Press, 4th Edition, ISBN: 978-0198847595

We plan to cover the following chapters (subject to change at the instructor's discretion):

1. Events and their probabilities
2. Random variables and their distributions
3. Discrete random variables
4. Continuous random variables
5. Generating functions and their applications
6. Convergence of random variables
7. Random processes
8. Stationary processes

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>MATH</b>	Number (eg. 810) <b>750</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Introduction to Topology</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Introduction to Topology</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description) <b>Topics from point set topology include: basic definitions, continuous maps, homeomorphisms, product and quotient topologies, Hausdorff topologies, connectedness, compactness and compactifications. Topics from algebraic topology include: paths, homotopies, fundamental group, universal covering spaces.</b>		
Rationale for introduction of this course <b>To increase offerings of graduate courses to students in graduate programs in Department of Mathematics. The material covered in MATH 750 is quite relevant to some other graduate courses such as MATH 818, MATH 820 and also to the topics courses.</b>		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings/year <b>once in 2 years</b>	Estimated enrollment per offering <b>5</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>MATH 450</b>		
Prerequisite and/or Corequisite		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/>		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? <b>0</b>	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students: <b>Combined with MATH 450. Students enrolled in MATH 750 will be assigned additional problems on assignments and exams.</b>		

\* See important definitions on the curriculum website.

## RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Nathan Ilten, Nils Bruin, Tom Archibald, Imin Chen</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course <b>None.</b>



## CONTACT PERSON

Academic Unit / Program <b>Mathematics</b>	Name (typically, Graduate Program Chair) <b>Ben Adcock</b>	Email <b>ben_adcock@sfu.ca</b>
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign


Graduate Program Committee <b>Petr Lisonek</b>	Signature 	Date <b>19 Oct 2022</b>
Department Chair <b>Manfred Trummer</b>	Signature 	Date <b>19 Oct 2022</b>

## FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Vance Williams</b>	Signature 	Date <b>November 30, 2022</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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### ADMINISTRATIVE SECTION (for DGS office only)

Library Check: \_\_\_\_\_  
 Course Attribute: \_\_\_\_\_  
 Course Attribute Value: \_\_\_\_\_  
 Instruction Mode: \_\_\_\_\_  
 Attendance Type: \_\_\_\_\_

If different from regular units:  
 Academic Progress Units: \_\_\_\_\_  
 Financial Aid Progress Units: \_\_\_\_\_

**MATH 750**  
**Introduction to Topology**  
Course Outline

**Calendar description:** Point set topology: definition, continuous maps, homeomorphisms, product and quotient topologies, Hausdorff topologies, connectedness, compactness and compactifications. Algebraic topology: paths, homotopies, fundamental group, universal covering spaces.

**Course details:** Topology is the study of spaces under continuous deformation and provides the foundation for many topics in modern mathematics, including geometry, differential equations, number theory, and graph theory.

**Topics studied in this course include:**

Topological Spaces, Basis for a Topology, The Order Topology.  
The Product Topology, The Subspace Topology, Closed Sets and Limit Points.  
Continuous Functions, The Metric Topology, The Quotient Topology.  
Connected Spaces, Components and Local Connectedness, Compact Spaces.  
The Countability Axioms, The Separation Axioms, Normal Spaces.  
The Urysohn Lemma, The Urysohn Metrization Theorem.  
Homotopy of Paths, The Fundamental Group, Covering Spaces.  
The Fundamental Group of the Circle, Retractions and Fixed Points.  
Deformation Retracts and Homotopy Type.  
The Fundamental Group of  $S^n$ , Fundamental Groups of Some Surfaces.  
Simplicial and Singular Homology.  
Additional Topics.

**Grading:**

Participation 10%  
Assignments 20%  
Midterm 30%  
Final 40%

This course will be taught in conjunction with MATH 450. Students in MATH 750 will be assigned additional problems on assignments and exams.

**Textbook:** "Topology" by James Munkres. Pearson, 2nd edition. ISBN: 9780134689517. Required.

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>MATH</b>	Number (eg. 810) <b>775</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Mathematical Data Science</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Math Data Sci</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description) <b>An exploration of the mathematics of data science. Analysis of the foundations of algorithms currently used in the field. Potential topics to be covered include: machine learning, compressed sensing, clustering, randomized numerical linear algebra, complex networks and random graph models.</b>		
Rationale for introduction of this course <b>1) To increase the number of graduate-level offerings in mathematics of data science - an area of high demand amongst our students. 2) To be consistent with our other 400-level undergraduate courses, which are paired with 700-level courses.</b>		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings/year <b>once every two years</b>	Estimated enrollment per offering <b>5</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>MATH 475 (two-way), APMA 940 (one way, MATH 775 equivalent to APMA 940)</b>		
Prerequisite and/or Corequisite <b>None</b>		
Criminal record check required? <input type="checkbox"/> Yes    if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/> _____		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No    If yes, identify which undergraduate course and the additional course requirements for graduate students: <b>MATH 475. Students in MATH 775 will complete additional coursework, which may include a combination of additional homework problems, a project or extra exam questions.</b>		

\* See important definitions on the curriculum website.

**RESOURCES**

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>Paul Tupper, Ben Adcock, Caroline Colijn, Cedric Chauve</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course <b>None</b>



**CONTACT PERSON**

Academic Unit / Program <b>Mathematics</b>	Name (typically, Graduate Program Chair) <b>Ben Adcock</b>	Email <b>ben_adcock@sfu.ca</b>
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**ACADEMIC UNIT APPROVAL**

A course outline must be included.

Non-departmentalized faculties need not sign

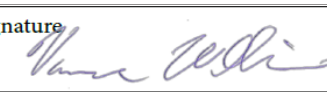
Graduate Program Committee <b>Petr Lisonek</b>	Signature 	Date <b>19 Oct 2022</b>
Department Chair <b>Manfred Trummer</b>	Signature 	Date <b>19 Oct 2022</b>

**FACULTY APPROVAL**

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Vance Williams</b>	Signature 	Date <b>November 30, 2022</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

**SENATE GRADUATE STUDIES COMMITTEE APPROVAL**

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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ADMINISTRATIVE SECTION (for DGS office only) Library Check: _____ Course Attribute: _____ Course Attribute Value: _____ Instruction Mode: _____ Attendance Type: _____	If different from regular units: Academic Progress Units: _____ Financial Aid Progress Units: _____
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Department of Mathematics, Simon Fraser University  
**Outline: Mathematical Data Science MATH 775**

**Grading Scheme:** Assignments 30%, Presentation 10%, Participation 5%, Midterm 20% and Final Project 35%.

**Calendar Description:** An exploration of the mathematics of data science. Analysis of the foundations of algorithms currently used in the field. Potential topics to be covered include: machine learning, compressed sensing, clustering, randomized numerical linear algebra, complex networks and random graph models. Students with credit for MATH 475 or APMA 940 may not complete this course for further credit.

**Course Details:**

Subject to change at the instructor's discretion.

- Mathematical preliminaries (probability, linear algebra)
- Linear dimensionality reduction (SVD, PCA, random projections)
- Linear regression (linear least squares, subset selection, LASSO, regularization)
- Topics from compressed sensing (sparsity and best  $s$ -term approximation, basis pursuit, greedy methods, thresholding, restricted isometry property and Johnson–Lindenstrauss Lemma, uncertainty principles)
- Foundations of learning (statistical learning theory, PAC learning, VC dimension, rate-distortion theory)
- Deep learning (neural networks, autoencoders, GANs)
- Classification (SVMs, kernel methods, logistic regression)
- Algorithms for Big Data (sketching, streaming)
- Clustering (k-means, spectral clustering, kernel methods)

**Text:** *Foundations of Data Science* by Avrim Blum, John Hopcroft, and Ravindran Kannan, Cambridge University Press, 2020.

**Alternative Text:** *Machine Learning: A Probabilistic Perspective* by Kevin P. Murphy, MIT Press, 2012.



**MEMO**

**Faculty of  
Science**

ATTENTION: Senate Graduate Studies Committee

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FROM: Vance Williams, Associate Dean Graduate Studies,  
Faculty of Science

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RE: Proposed Course Changes and Additions for Fall 2023,  
Faculty of Science

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DATE: February 8, 2023

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Dear SGSC,

The following curriculum change has been approved by the Faculty of Science and are being submitted to the Senate Graduate Studies committee for approval.

The following *new course* is being proposed:

**MBB 778** Molecular Epidemiology of Infectious Disease

Enclosed are the documents in support of this new course.

Sincerely,

A handwritten signature in blue ink that reads "Vance Williams".

---

Vance Williams  
Associate Dean Graduate Studies, Faculty of Science



**MOLECULAR BIOLOGY AND BIOCHEMISTRY**  
**Memorandum**

**To:** Vance Williams, Chair, Faculty Graduate  
Studies Committee, Faculty of Science

**From:** Christopher Beh, MBB Graduate  
Program Chair

**Re: New Graduate Course:** MBB 778

**Date:** February 6, 2023

---

We are requesting approval of the following:

**NEW GRADUATE COURSE PROPOSAL**

**MBB 778: Molecular Epidemiology of Infectious Disease** (form and outlines  
attached)

Sincerely,



Dr. Christopher Beh

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MBB Graduate Program Chair

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>MBB</b>	Number (eg. 810) <b>778</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Molecular Epidemiology of Infectious Disease</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Molecular Epidemiology</b>		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description - max. 50 words) <b>Application of modern molecular methods to epidemiological studies. Globally-relevant and emerging infectious diseases will be highlighted.</b>		
Rationale for introduction of this course The creation of this course reflects the expansion of expertise and student interest in modern molecular techniques applied to the surveillance, prevention and treatment of globally-relevant infectious diseases. MBB and FHS have a long standing tradition of cross-listed courses that are taught by members of both units and that have an almost equal distribution of students from both units enrolled. Both Units support the creation of MBB 778 in order to cross-list this course with HSCI 778.		
Term of initial offering (eg. Fall 2019) <b>Fall 2023</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings/year <b>Once</b>	Estimated enrollment per offering <b>8</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses) <b>MBB 478, HSCI 478, HSCI 778 - MBB 778 will be cross-listed with the HSCI equivalents.</b>		
Prerequisite and/or Corequisite		
Criminal record check required? <input type="checkbox"/> Yes if yes is selected, add this as prerequisite		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus		
Course Components * <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/>		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input type="checkbox"/> No
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Final exam required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students: <b>MBB 478; difference in grading. See course outlines with differences highlighted in yellow.</b>		

\* See important definitions on the curriculum website.

**RESOURCES**

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <b>William Hsiao - joint appointment in FHS and MBB</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course <b>Robert Holt, Ryan Morin, Fiona Brinkman</b>

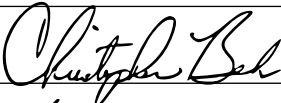

**CONTACT PERSON**

Academic Unit / Program <b>MBB</b>	Name (typically, Graduate Program Chair) <b>Christopher Beh</b>	Email <b>ctbeh@sfu.ca</b>
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**ACADEMIC UNIT APPROVAL**

A course outline must be included.

Non-departmentalized faculties need not sign


Graduate Program Committee <b>Christopher Beh</b>	Signature 	Date <b>Feb. 6, 2023</b>
Department Chair <b>Lisa Craig</b>	Signature 	Date <b>Feb. 8, 2023</b>

**FACULTY APPROVAL**

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Vance Williams</b>	Signature 	Date <b>February 8, 2023</b>
---	--	---------------------------------

A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

**SENATE GRADUATE STUDIES COMMITTEE APPROVAL**

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>March 15, 2023</b>
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ADMINISTRATIVE SECTION (for DGS office only) Library Check: _____ Course Attribute: _____ Course Attribute Value: _____ Instruction Mode: _____ Attendance Type: _____	If different from regular units: Academic Progress Units: _____ Financial Aid Progress Units: _____
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## MBB/HSCI 478-3: Molecular Epidemiology of Infectious Disease

**Pre or Co-requisites:** MBB 331 or HSCI/MBB 326 with a minimum grade of C, or HSCI 338 with a minimum grade of C-. Students with credit for HSCI 478 may not complete MBB 478 for further credit.

**Final Exam:** In person during the final exam period

**COURSE DESCRIPTION:** This senior seminar course will provide a broad overview of the application of modern molecular and genomics methods to infectious disease epidemiology. Topics will include the identification, classification, characterization, and monitoring of pathogens in human populations; the application of molecular methods to screening, prevention and treatment of infectious diseases; and the analysis of molecular and genomics data for disease. Globally relevant diseases will be highlighted.

*The SFU Calendar describes the course as follows:* Application of modern molecular methods to epidemiological questions. Globally relevant and emerging infectious diseases will be highlighted. Students with credit for HSCI 432 in 2010 may not complete HSCI 478 for further credit.

### **COURSE OBJECTIVES:**

By the end of the course, students will have a strong foundational knowledge of molecular and genomic epidemiology methods, the distribution of host and pathogen genetic diversity in populations, and an understanding of how genetic factors influence disease risk and outcomes. The assignments for this course will provide students with the opportunity to develop, or hone, their presentation skills, their ability to perform primary literature searches, as well as improve their reading, interpreting, critiquing and summarizing of primary research articles. Hands-on computational data analysis assignments are designed to show students state-of-the-art genomic epidemiology analytic solutions.

- Explain the techniques and applications of modern laboratory methods, including phylogenetic analyses, to the identification, surveillance, prevention, and treatment of infectious diseases
- Describe how host and pathogen genetic variation is distributed globally and enumerate examples of how such variation influences disease acquisition risk and disease outcomes
- Explain how information on pathogen genetic variation is (and can be) incorporated in the design of intervention strategies (e.g.: vaccines, therapeutics)
- Conduct basic literature searches
- Conduct basic genomic epidemiological data analysis
- Demonstrate competence in reading, interpreting and critiquing primary research articles and present the material in an accessible manner

### **CORE COMPETENCIES:**

*Molecular Methods for Microbial Typing – Primary*  
*Microbial Phylogenetics and Phylogenomics – Primary*  
*Basic Molecular and genomic Epidemiology – Primary*  
*Public Health Microbiology - Primary*  
*Molecular Biology – reinforced*  
*Microbial Population Genetics – reinforced*

**TEACHING FORMAT:** There will be one 3-hour class each week that will include a lecture by the course instructor or guest lecturer, discussion, in-class activities and/or student presentations.

**REQUIRED TEXT: None.**

Required readings will be in the form of primary and review articles in scientific journals. These will be made available on Canvas prior to the lecture. This will include PowerPoint versions of the lectures, links to online materials, announcements, and other information. PowerPoint versions of the lectures will be provided by 5pm the day before the lecture. Please check Canvas on a regular basis to ensure you have updated course information.

## ASSESSMENTS AND GRADING:

This course comprises a combination of lectures, demos, in class and online discussions. Six in class short quizzes (2-3 questions / 15 min) at the beginning of the classes (see dates below) are designed to help you keep up with the material. Three take-home computational assignments are designed to help you learn hands-on genomic epidemiology analysis.

1. Assignment #1: Molecular Typing – in-silico MLST
2. Assignment #2: Genomic Variant Analysis - SNP
3. Assignment #3: Genome-wide Association Study
3. Oral Presentation: Peer-reviewed paper related to modern molecular or genomic epidemiology 3-4 min per person on a paper in a

### 4. Quizzes:

The quizzes will cover material presented in the preceding one or two weeks (non-cumulative) to help you demonstrate your understanding of the course concepts. The test will consist of multiple choice and true/false.

### 5. Final Exam

The final exam will be based on all course lectures and readings. The exam will consist of short and long answer questions.

### 6. Mark Breakdown

6 Quizzes (5% each) - missing quizzes count towards final – 30%

3 x Genomic Epi Data Analysis Assignments (10% each) - 30%

Final Exam – 30% (up to 60% if there are missing quizzes)

Participation – 10%

## COURSE SCHEDULE:

Please complete the assigned readings before each class as lectures will be presented based on the assumption that you have read these materials.

### Class Schedule:

Date (week)	First Half (2:30-3:45)	Second Half (4:00-5:20)
September 12 2022	1a Welcome	1b Introduction to Molecular Epidemiology
September 19 2022	2a Pathogen Evolution - bacterial	2b Pathogen Evolution - viral
September 26 2022	3a Population Genetics Discussion	3b Host Variations and Immunity
October 3 2022	Quiz 1 (5%) Population Genetics 4a Traditional Molecular Epidemiology Techniques	4b Modern Molecular Epidemiology Techniques Assignment 1 (Molecular Typing Using in-silico MLST)
October 10 2022 (Thanksgiving)	No Class	No Class
October 17 2022	Quiz 2 (5%) Molecular Epi Techniques	5b Phylogenetic Analysis Discussion and Demo

	<b>5a Phylogenetic Analysis</b>	
<b>October 24 2022</b>	<b>Quiz 3 (5%) Phylogenetics</b> <b>6a Genomic Epidemiology</b>	<b>6b Genomic Epidemiology Discussion and Demo</b> <b>Assignment 2 (Genomic Epidemiology - SNP)</b>
<b>October 31 2022</b>	<b>7a Genomic Epidemiology of MTB</b>	<b>7b Genomic Epidemiology of MTB Discussion</b>
<b>November 7 2022</b>	<b>Quiz 4 (5%) Genomic Epi (6a+7a)</b> <b>8a Genomic Epidemiology of Foodborne Pathogens</b>	<b>8b Genomic Epidemiology of Foodborne Pathogens Discussion</b>
<b>November 14 2022</b>	<b>9a Bacterial GWAS</b>	<b>9b Bacterial GWAS Discussion and Demo</b> <b>Assignment 3 (Bacterial GWAS)</b>
<b>November 21 2022</b>	<b>Quiz 5 (5%) Bacterial GWAS</b> <b>10a Genomic Epidemiology of Influenza Viruses</b>	<b>10b Genomic Epidemiology of Influenza Viruses Discussion</b>
<b>November 28 2022</b>	<b>Quiz 6 (5%) Genomic Epi of Influenza</b> <b>11a Genomic Epidemiology of SARS-CoV-2 Virus</b>	<b>11b Genomic Epidemiology of SARS-CoV-2 Virus Discussion</b>
<b>December 5 2022</b>	<b>12a Future of Genomic Epidemiology</b>	<b>Course Feedback and Exam Review</b>

**NOTE:** The instructor may make changes to this syllabus if necessary, within Faculty/University regulations. This includes the possibility of scaling final grades, if they are too high or too low, to meet FHS and SFU grading guidelines.

## MBB/HSCI 778-3: Molecular Epidemiology of Infectious Disease

**Pre or Co-requisites:** None

**Final Exam:** None

### **CALENDAR DESCRIPTION:**

Application of modern molecular methods to epidemiological studies. Globally relevant and emerging infectious diseases will be highlighted.

**COURSE DESCRIPTION:** The application of modern molecular and genomics methods to study the epidemiology of infectious diseases will be explored through lectures and discussions. Topics will include the identification, classification, characterization, and monitoring of pathogens in human populations; the application of molecular methods to screening, prevention and treatment of infectious diseases; and the analysis of molecular and genomics data for disease. Globally relevant diseases will be highlighted.

### **COURSE OBJECTIVES:**

By the end of the course, students will have a strong foundational knowledge of molecular and genomic epidemiology methods, the distribution of host and pathogen genetic diversity in populations, and an understanding of how genetic factors influence disease risk and outcomes. The activities throughout the course will provide students with the opportunity to become familiar with relevant review and primary literatures, and improve their reading, interpretation and critiquing of research articles. Hands-on computational data analysis assignments are designed to show students state-of-the-art molecular and genomic epidemiology analytic solutions.

- Explain the techniques and applications of modern laboratory methods, including phylogenetic analyses, to the identification, surveillance, prevention, and treatment of infectious diseases
- Describe how host and pathogen genetic variation is distributed globally and enumerate examples of how such variation influences disease acquisition risk and disease outcomes
- Explain how information on pathogen genetic variation is (and can be) incorporated in the design of intervention strategies (e.g.: vaccines, therapeutics)
- Conduct basic literature searches
- Conduct basic genomic epidemiological data analysis
- Demonstrate competence in reading, interpreting and critiquing primary research articles

### **CORE COMPETENCIES:**

*Molecular Methods for Microbial Typing – Primary*  
*Microbial Phylogenetics and Phylogenomics – Primary*  
*Basic Molecular and genomic Epidemiology – Primary*  
*Public Health Microbiology - Primary*  
*Molecular Biology – reinforced*  
*Microbial Population Genetics – reinforced*  
*Presentation skills - reinforced*

**TEACHING FORMAT:** There will be one 3-hour class each week that will include a lecture by the course instructor or guest lecturer, discussion, in-class activities and/or student presentations.

**REQUIRED TEXT:** None.

Required readings will be in the form of primary and review articles in scientific journals. These will be made available on Canvas prior to the lecture. This will include PowerPoint versions of the lectures, links to online materials, announcements, and other information. PowerPoint versions of the lectures will be provided by 5pm the day before the lecture. Please check Canvas on a regular basis to ensure you have updated course information.

## ASSESSMENTS AND GRADING:

This course comprises a combination of lectures, demos, in class and online discussions. Six in class short quizzes (2-3 questions / 15 min) at the beginning of the classes (see dates below) are designed to help you keep up with the material. Three take-home computational assignments are designed to help you learn hands-on genomic epidemiology analysis.

1. Assignment #1: Molecular Typing – in-silico MLST

2. Assignment #2: Genomic Variant Analysis - SNP

3. Assignment #3: Genome-wide Association Study

4. Quizzes:

The quizzes will cover material presented in the preceding one or two weeks (non-cumulative) to help you demonstrate your understanding of the course concepts. The test will consist of multiple choice and true/false.

5. Current Paper Presentation

The presentation will be based on reviewing and presenting one or more current papers related to a topic in molecular biology. An additional graduate student only session will be scheduled for the presentation in the last two weeks of the class.

6. Term paper

Due after the last day of classes.

### 7. Mark Breakdown

6 Quizzes (5% each) - missing quizzes count towards final – 30%

3 x Genomic Epi Data Analysis Assignments (10% each) - 30%

1 x Presentation on a current genomic epidemiology study – 10%

Term paper – 20%

Participation – 10%

## COURSE SCHEDULE:

Please complete the assigned readings before each class as lectures will be presented based on the assumption that you have read these materials.

### Class Schedule:

Date (week)	First Half (2:30-3:45)	Second Half (4:00-5:20)
September 12 2022	1a Welcome	1b Introduction to Molecular Epidemiology
September 19 2022	2a Pathogen Evolution - bacterial	2b Pathogen Evolution - viral
September 26 2022	3a Population Genetics Discussion	3b Host Variations and Immunity
October 3 2022	Quiz 1 (5%) Population Genetics 4a Traditional Molecular Epidemiology Techniques	4b Modern Molecular Epidemiology Techniques Assignment 1 (Molecular Typing Using in-silico MLST)
October 10 2022 (Thanksgiving)	No Class	No Class



<b>October 17 2022</b>	<b>Quiz 2 (5%) Molecular Epi Techniques</b> <b>5a Phylogenetic Analysis</b>	<b>5b Phylogenetic Analysis Discussion and Demo</b>
<b>October 24 2022</b>	<b>Quiz 3 (5%) Phylogenetics</b> <b>6a Genomic Epidemiology</b>	<b>6b Genomic Epidemiology Discussion and Demo</b> <b>Assignment 2 (Genomic Epidemiology - SNP)</b>
<b>October 31 2022</b>	<b>7a Genomic Epidemiology of MTB</b>	<b>7b Genomic Epidemiology of MTB Discussion</b>
<b>November 7 2022</b>	<b>Quiz 4 (5%) Genomic Epi (6a+7a)</b> <b>8a Genomic Epidemiology of Foodborne Pathogens</b>	<b>8b Genomic Epidemiology of Foodborne Pathogens Discussion</b>
<b>November 14 2022</b>	<b>9a Bacterial GWAS</b>	<b>9b Bacterial GWAS Discussion and Demo</b> <b>Assignment 3 (Bacterial GWAS)</b>
<b>November 21 2022</b>	<b>Quiz 5 (5%) Bacterial GWAS</b> <b>10a Genomic Epidemiology of Influenza Viruses</b>	<b>10b Genomic Epidemiology of Influenza Viruses Discussion</b>
<b>November 28 2022</b>	<b>Quiz 6 (5%) Genomic Epi of Influenza</b> <b>11a Genomic Epidemiology of SARS-CoV-2 Virus</b>	<b>11b Genomic Epidemiology of SARS-CoV-2 Virus Discussion</b>
<b>December 5 2022</b>	<b>12a Future of Genomic Epidemiology</b>	<b>Course Feedback</b>

**NOTE:** The instructor may make changes to this syllabus if necessary, within Faculty/University regulations. This includes the possibility of scaling final grades, if they are too high or too low, to meet FHS and SFU grading guidelines.