



SENATE

NOTICE OF MEETING

October 5, 2017

Please be advised that the next regular meeting of Senate will be held on Friday, October 13, 2017, at 2 p.m., in the Norman D. Hébert, LLD Meeting Room (Room EV 2.260) on the SGW Campus.

Please note that Closed Session documents and discussions are confidential.

A copy of the Graduation List will be available for consultation in the meeting room from 1:30 p.m. and 2:00 p.m. on the meeting day.

Members of Senate who cannot attend are requested to notify Evelyne Loo as soon as possible at evelyne.loo@concordia.ca or ext. 4814. You may also contact Evelyne if you have any problems accessing the documents.

A handwritten signature in blue ink that reads "D. Tessier".

Danielle Tessier
Secretary of Senate



AGENDA OF THE OPEN SESSION OF THE MEETING OF SENATE

Held on Friday, October 13, 2017,
following the meeting of the Closed Session
in the Norman D. Hébert, LL.D. Meeting Room
(Room EV 2.260) on the SGW Campus

Item	Presenter/s	Action
1. Call to order	A. Shepard	
1.1 Adoption of the Agenda	A. Shepard	Approval
1.2 Adoption of September 15, 2017 Minutes	A. Shepard	Approval
2. Business arising from the Minutes not included on the Agenda	A. Shepard	
3. President's remarks	A. Shepard	Information
4. Academic update (<i>Document US-2017-6-D3</i>)	G. Carr	Information
5. Report of Standing Committees		Information
5.1 Academic Planning and Priorities (<i>Document US-2017-4-D4</i>)		
5.2 Finance (<i>Document US-2017-4-D5</i>)		
CONSENT AGENDA	A. Shepard	
6. Committee appointments (<i>Document US-2017-6-D6</i>)		Approval
7. Academic Programs Committee: Report and recommendations (<i>Document US-2017-6-D7</i>)		Approval
7.1 Graduate curriculum changes – Faculty of Engineering and Computer Science		

- 7.1.1 Department of Electrical and Computer Engineering
(*Document US-2017-6-D9*)
- 7.1.2 Department of Mechanical and Industrial Engineering
(*Document US-2017-6-D10*)

REGULAR AGENDA

8. Academic Programs Committee: Report and recommendations (*Document US-2017-6-D7*)
- 8.1 New undergraduate program – Faculty of Arts and Science – Department of Physics – Minor in Biophysics (*Document US-2017-6-D8*) A. Roy Approval
9. Annual report of the academic hearing panel (*Document US-2017-6-D11*) M. Sullivan Information
10. Overview of the results of the National Survey of Student Engagement (NSSE) and academic advising initiatives L. Ostiguy Information
11. Strategic directions update G. Carr Information
12. Question period (*maximum - 15 minutes*)
13. Other business
14. Adjournment A. Shepard

MINUTES OF THE OPEN SESSION
OF THE MEETING OF SENATE

Held on Friday, September 15, 2017, at 9 a.m.
in the TD Bank Financial Group Amphitheatre
(Room MB 3.210) on the SGW Campus

PRESENT

Voting members: Alan Shepard (*Chair*); Mohamed Allalou; Paul Allen; Amir Asif; Reena Atanasiadis; Guylaine Beaudry; Pascale Biron; Patrice Blais; Rory Blaisdell; Philippe Caignon; Saul Carliner; Graham Carr; Mikaela Clark-Gardner; Frank Crooks; Anne-Marie Croteau; Ricardo Dal Farra; Christine DeWolf; Jill Didur; Charles Draimin; Marcie Frank; Vince Graziano; Christophe Guy; Paul Joyce (*Acting on behalf of André Roy*); Tevfik Karatop; Chiranjeevi Koduri; Mahesh Natarajan; Lorraine Oades; Virginia Penhune; John Potvin; Harald Proppe; André Roy; Daniel Salée; Francesca Scala; Yousef Shayan; Ali Sherra; Thufile Sirajudeen; Marc Steinberg; Julia Sutera Sardo; Sofière Tahar; Christopher Trueman; Jean-Philippe Warren; Paula Wood-Adams

Non-voting members: Joanne Beaudoin; Philippe Beauregard; Roger Côté; Isabel Dunnigan; Bram Freedman; Emmet Henchey; Frederica Jacobs; Lisa Ostiguy; Daniel Therrien

ABSENT

Voting members: Rebecca Duclos; Brigitte Jaumard; David Morris; Evan Pitchie; Martin Pugh; Robert Soroka

Non-voting members: Denis Cossette

1. **Call to order**

The President called the meeting to order at 9:05 a.m.

1.1 **Approval of Agenda**

R-2017-5-1 *Upon motion duly moved and seconded, it was unanimously resolved that the Agenda of the Open Session be approved.*

1.2 Approval of the Minutes of the Open Session meeting of May 19, 2017

R-2017-5-2 *Upon motion duly moved and seconded, it was unanimously resolved that the Minutes of the Open Session meeting of May 19, 2017 be approved.*

2. Business arising from the Minutes not included on the Agenda

There was no business arising from the Minutes not included on the Agenda.

3. Senate orientation (Document US-2017-5-D1)

Me Jacobs underlined that four major documents were included in the orientation documentation provided in the Senate documentation which Senators should review:

- Code of ethics and conduct applicable to members of Senate and members of committees established by Senate ([US-1](#))
- Guidelines pertaining to the recording and broadcasting of senate meetings ([US-2](#))
- An extract from Concordia's By-Laws regarding [Membership, meetings, functions and powers of Senate](#)
- [Summary of procedures at Senate meetings and rules of order](#)

While all of the information is important and relevant, she presented three key take-aways with respect to Senators understanding their role and duties, the importance of preserving confidentiality and familiarizing themselves with the meeting procedures so that Senate can, as a group, adhere to good meeting practices.

She urged Senators to read the [Senator's Handbook](#) which is posted on the Senate website and to contact Ms. Tessier for any questions in relation to the operations of Senate.

4. President's remarks

Prof. Shepard welcomed Senators to the first meeting of the academic year and underlined the following appointments which took effect this summer:

- Christophe Guy, Vice-President, Research and Graduate Studies
- Anne-Marie Croteau, Dean, John Molson School of Business
- Sandra Gabriele, Vice-Provost, Innovation in Teaching and Learning
- Guylaine Beaudry, Vice-Provost, Digital Strategy, in addition to her duties as University Librarian

Prof. Shepard also commented on several initiatives and activities which took place on and off campus during the course of the summer. He also apprised Senators of the following:

- The University was mourning the loss of Associate Vice-President, Facilities Management, Michel Nadeau, who passed away suddenly on September 3.

- The construction of the new applied science incubator can now begin on the Loyola Campus, following the minor zoning change recently accepted by the NDG Borough Council.
- If enrolments constitute a measure of how the University is performing, then it is doing well, since a record number of new undergraduate and graduate students have registered this Fall, totaling approximately 9,500.

5. Academic update (Document US-2017-5-D2)

Dr. Carr summarized the highlights of his written report, noting a correction in the third paragraph from the bottom of page 2, where it should be indicated that Dr. Darren Wershler (CURC in Media & Contemporary Literature, Concordia) led the one-week graduate course on media archaeology, with special guests Dr. Jussi Parikka (University of Southampton) and Dr. Lori Emerson (University of Colorado Boulder).

CONSENT

6. Committee appointments (Document US-2017-5-D3)

R-2017-5-3 *That the committee appointments, outlined in Document US-2017-5-D3 (revised), be approved.*

7. Academic Programs Committee: Report and recommendations (Document US-2017-5-D4)

7.1 Undergraduate curriculum changes – Faculty of Arts and Science

7.1.1 Department of Biology (Document US-2017-5-D5)

7.1.2 Department of History (Document US-2017-5-D6)

7.1.3 Department of Philosophy (Document US-2017-5-D7)

7.1.4 Department of Theological Studies (Document US-2017-5-D8)

R-2017-5-4 *That the undergraduate curriculum changes in the Faculty of Arts and Science, outlined in Documents US-2017-5-D5 to D8, be approved, as recommended by the Academic Programs Committee in Document US-2017-5-D4.*

7.2 Undergraduate curriculum changes – Faculty of Engineering and Computer Science

7.2.1 Department of Computer Science and Software Engineering (Document US-2017-5-D9)

7.2.2 Engineering and Computer Science undergraduate programs (Document US-2017-5-D10)

R-2017-5-5 *That the undergraduate curriculum changes in the Faculty of Engineering and Computer Science, outlined in Documents US-2017-5-D9 and D10, be approved, as recommended by the Academic Programs Committee in Document US-2017-5-D4.*

7.3 Undergraduate curriculum changes – Faculty of Fine Arts

7.3.1 Department of Design and Computation Arts (Documents US-2017-5-D11 and D12)

7.3.2 Department of Music (Document US-2017-5-D13)

R-2017-5-6 *That the undergraduate curriculum changes in the Faculty of Fine Arts, outlined in Documents US-2017-5-D11 and D12, be approved, as recommended by the Academic Programs Committee in Document US-2017-5-D4.*

REGULAR

8. Presentation on Student Success Centre

The Director of the [Student Success Centre](#), Dr. Laura Mitchell, was pleased to have the opportunity to convey the Centre's broad and exciting mandate. The Centre is a one-stop place which offers resources to assist students in understanding and achieving their goals. All students are encouraged to call upon the services offered by the Centre, not only those who are struggling academically or seeking remedial assistance.

Students are offered support in three main ways:

1. To transition first year students into university life and studies and ensure that they have the resources needed to succeed;
2. To support learning by helping students to develop the academic skills to reach their potential in the classroom; and
3. To prepare students for a successful career and professional life.

Dr. Mitchell elaborated on the Centre's services in connection with orientation, career planning and learning. With respect to the latter, she apprised Senators of two new courses, UNSS 200 and 201, for students who have been readmitted. She explained the design features of those courses which aim to help those students get back on the right academic track.

The Centre also provides support for Rhodes and Gates scholarship applications and will be offering a new tool, Next-Gen Skills, modeled on the GradPro Skills, to assist undergraduates in developing their personal and professional skills for transition from the classroom to the workplace.

Copy of Dr. Mitchell's full presentation is posted on the [Senate website](#).

9. Update from the Registrar

Pursuant to the presentation regarding Reading Week given at the April Senate meeting, Mr. Therrien explained that the proposal to delay Reading Week by one week to allow for seven weeks of classes prior to Reading Week was received as a step in the right direction. Pursuant to that meeting, very few comments were sent advocating for alignment with the Spring Break of the school boards.

As indicated at that meeting, given that the 2017/2018 calendar has already been set, Reading Week for this academic year will be held during the week of February 18, 2018. However, for the 2018/2019 calendar, Reading Week will be set one week later, during

the week of February 24, 2019, further to which an evaluation will be conducted to decide how to proceed going forward.

10. Question period

In response to a question, Dr. Carr updated Senate on the work of the Indigenous Directions Leadership Group. The latter held a retreat in late July and has an upcoming meeting, further to which it will present a series of initiatives to propose this year. Dr. Carr indicated that he can report on those initiatives at the October Senate meeting.

Dr. Gabriele added that the Centre for Teaching and Learning Services (CTLS) has posted a position for an Indigenous Curriculum and Pedagogy Advisor.

11. Other business

There was no other business to bring before Senate.

12. Adjournment

The meeting adjourned at 10:21 a.m.



Danielle Tessier
Secretary of Senate

Internal Memorandum

To: Members of Senate
From: Graham Carr, Provost and Vice-President, Academic Affairs
Date: October 4, 2017
Re: Academic Update

Further to last month's meeting, I invite Senators who are interested in the work being done by the Indigenous Directions Leadership Group (IDLG) to visit the Indigenous Directions hub at <http://www.concordia.ca/indigenous>. Towards the end of each month, the IDLG also sends out a monthly newsletter. If you would like to be added to the email list, you can follow this link to [subscribe via Mailchimp](#).

On September 1 and 21, GradProSkills held its annual Grad School Base Camp for new graduate students. The event is a condensed version of six GradProSkills workshops that cover fundamental topics aimed at preparing students for a successful start to graduate school. The room was full to capacity, on both occasions, with 110 students in attendance. They actively participated in the *Library Skills, Effective Reading, Embracing Diversity, Time Management, and Academic Code of Conduct* workshops, and expressed their appreciation that this event provided them with information to help them adapt and succeed in their graduate studies. It also gave them the opportunity to meet students from other disciplines and to develop an understanding of the Concordia community.

A reminder that September 12 marked the reopening of the Webster Library 4th floor as well as the 3rd floor, west side. With these spaces, the Webster Transformation Project completed its fourth and final phase, more than doubling the seating capacity to 3136, including additional space reserved exclusively for Concordia graduate students. In the month of September, the Libraries had 175,450 visitors (including Webster, Vanier, and Grey Nuns).

On September 21 and 22, Vice-Provosts Nadia Hardy and Sandra Gabriele ran two workshops on *Best Practices for Multi-Section Courses*. The workshops were well-attended and very good conversations ensued about the challenges of trying to ensure that students experience similar course content and assessments across sections of a course. The Vice-Provosts will make available the Best Practices document as soon as updates are made to it.

On September 28-30, Milieux hosted a successful symposium on the cultural intermediaries within the independent game development industry. The symposium included a roster of influential members of the indie gaming design and research world, and functioned as a research field site for a team of graduate students in sociology who are producing an ethnographic account of the cross-field interactions between the academic and industry participants in the symposium. More details are available at <http://www.indieinterfaces.com>

CTEC (Concordia Teacher Education Council) successfully hosted a visit from CAPFE (an arms-length committee of the Ministry of Education) who confirmed the accreditation of the Early Childhood Education, Art Education and Teaching English as a Second Language programs. Congratulations to all the faculty and staff involved in these programs and the Deans of Arts and Science and Fine Arts.

In my previous report, I had noted that Philip Abrami (Education and Centre for the Study of Learning and Performance) accepted the UNESCO King Sejong Literacy Prize 2017 for the Learning Toolkit (LTK+). In addition, the *Conseil consultatif sur l'économie et l'innovation* is now recommending that the Government of Quebec fund a project by Concordia and UQAM to design a new web-based learning platform for adult literacy. This innovative program is based on the learning software ABRACADABRA, which is part of the LTK suite. It aims to boost workers' essential reading and writing skills in order to help them maintain their long-term employability.

A new performing arts research cluster has joined the Milieux cluster family: LePARC (the Performing Arts Research Cluster). LePARC is made up of faculty from the departments of theatre, contemporary dance, and music. Cluster co-directors are Eldad Tsabary and Angelique Willkie. Their new website is: <http://www.leparcmilieux.com>

The Leonard and Bina Ellen Gallery has launched the new series of exhibitions for 2017-18 the satellite cube SIGHTINGS in the Hall Building. The series will focus on psychopathologies.

The ENCS Distinguished Speakers Series will kick-off on October 5 with an event entitled *Navigating an Academic Career*. The event will include a keynote address from Jeff McDonnell, from the University of Saskatchewan.

On October 6, Milieux will co-present an afternoon-long workshop on the theme of *Artificial Intelligence and the Transdisciplinary Arts*, featuring guest speakers Roger Malina, executive editor of Leonardo Publications at MIT Press; Christa Sommerer of the University of Linz, Austria, a pioneer in interactive art; and Louise Poissant, Scientific Director of the FRQSC and former professor of media arts at UQAM. Leonardo has marked its 50th anniversary with special events at academic institutions around the world this year; it was an honor to be picked as a host institution.

On October 18, the 2017-2018 season debut of the Beyond Disciplines public lecture series will take place. The first event, *Let's Talk about Sex*, will convene Concordia researchers to talk about gender and sexuality from an interdisciplinary point of view. Organized by the Faculty of Arts and Science (FAS), this signature event series is commencing its third year of cross-discipline exploration. Speakers include Kimberley Manning (Simone de Beauvoir Institute), Marc Lafrance (Sociology & Anthropology), Jane McGaughey (School of Irish Studies), Gregorio Pablo Rodríguez-Arbolay Jr. (Art History) and Gonzalo Quintana Zunino (Psychology). Register at <https://www.eventbrite.com/e/beyond-disciplines-lets-talk-about-sex-tickets-38017919621>

Undergraduate students at the John Molson School of Business have the rare opportunity to manage a small-cap portfolio of stocks through the Van Berkomp Investment Management Program. Made possible by a donation in 2015 from alumnus J. Sebastian van Berkomp (BComm 69), the program accepts eight students annually to act as research associates to second-year fund

managers, working under the guidance and mentorship of senior investment professionals. Initially, the program was open only to graduate students, but program director Denis Schweizer (Finance), says he will be recruiting from all of JMSB's academic programs beginning this fall. The deadline for applying is October 31; read more about the program at <http://www.concordia.ca/jmsb/programs/graduate/van-berkom-investment-management.html>

PHOBIC2ICE won the 2017 Consortium for Aerospace Research and Innovation in Canada Innovative Project of the Year Award at their 3rd National Research Forum, held on August 8 and 9 in Vancouver. PHOBIC2ICE project is a collaboration between research engineers in Canada (including Ali Dolatabadi and Christian Moreau from ENCS) and Europe aiming to find surface engineering solutions for aviation-related icing problems. This team is working to create coatings that can be applied to the outside of an airplane body to make them resistant to ice formation. Whether a coating is extremely water-repellent or just very slippery, if it performs well in an icing situation, it's considered icephobic.

Postdoctoral researcher Ehsan Rezabeigi (PhD 15) is one of 20 finalists in for [La preuve par l'image](#) 2017, run by l'Association francophone pour le savoir (Acfas). Ehsan's image of a microbead, captured by a scanning electron microscope, is among 20 in the running for this year's Acfas photo prize. All the nominated pictures are on display at Montreal's Biodôme from now until the end of December 2017. The winners will be announced at the 73rd Gala de l'Acfas on November 8 – voting closed on October 1. The jury will award three prizes of \$2,000 each, and a fourth prize of \$2,000 for the audience favorite.

Robert Tittler (Distinguished Professor Emeritus of History) has been named a Fellow of the Royal Society of Canada and Louis Patrick Leroux (English and *Études françaises*) has been named to the Royal Society of Canada's College of New Scholars, Artists, and Scientists. Both will be inducted in a ceremony taking place on November 24.

A total of \$998,750 in funding was received through the NSERC Strategic Project Competition. Vincent Martin (Concordia University Research Chair in Microbial Engineering and Synthetic Biology, Biology and the Centre for Applied Synthetic Biology) received funding for his project, *Biochemicals from forestry biomass*, and Emad Shihab (Concordia University Research Chair in Analytics for Quality Mobile Software, Computer Science and Software Engineering) received funding for his project *Using big data analytics to improve decision making of system-on-module based solutions*.

Public Safety Canada's Community Resilience Fund, via the Canada Centre for Community Engagement and the Prevention of Violence, has granted funding to *Project SOMEONE (SOcial Media EducatiON Every day)*. Led by Vivek Venkatesh (Education and Centre for the Study of Learning and Performance) was created to sensitize youth, educators and the broader public to patterns of online hostility.

Kim McDonough (Canada Research Chair in Applied Linguistics, Education and Centre for the Study of Learning and Performance) along with Caroline Payant (UQAM) were awarded a Paragon Research Grant for their project, *The effect of planning on English L2 speakers' integrated writing CAEL test performance*.

Three Fine Arts student projects were selected last week as finalists in the Legado Public Art Competition. Seven teams of students presented designs for a new public art installation on the site of the Legado urban redevelopment project in Griffintown. They pitched to a jury of Concordians and industry leaders, including Natalie Volland, the president of Gestion Immobilière Quo Vadis, who launched the competition last Spring in collaboration with Concordia's Faculty of Fine Arts. Open to all Concordia students, the competition asked them to envision a public work of art that could engage the diverse community of Griffintown around its shared history and highlight the importance of creativity, sustainability and resiliency in developing urban projects. The following three groups passed into the second phase of the competition:

- Annabelle Daoust (Design) and Fany Rodrigue (Studio Arts), for 'Misty Valley'
- Tam Vu, Stacia Kiosses, Dylan Bourdeau, Alexis Gosselin and Andrea Pena (all Design), for 'Cornerstone'
- Allesia Signorino, Rachel Ann Timtiman and Lys Quintero (all Design), for 'Dynamo'

Alireza Mohammadi, a PhD student working with Fuzhan Nasiri from the Department of Building, Civil, and Environmental Engineering, won the best paper award at the 4th International Conference on Transportation Information and Safety.

Mohsen Rezaei, a graduate student working with Jia Yuan Yu, and co-supervised with a colleague in the Department of Geography, won Best Student Paper award at IEEE's 2017 Smart Cities Conference.

The Montreal Operations Research Student Chapter (MORSC) at Concordia has received the prestigious INFORMS CUM LAUDE award for student chapters. The Concordia chapter was established in May 2016 with the goal of becoming the hub for knowledge sharing and networking among the O.R. community in Montreal. This award is given by INFORMS, the world's largest and most recognized Operations Research society.

**ACADEMIC PLANNING AND PRIORITIES COMMITTEE
REPORT TO SENATE
Dr. Graham Carr
October 13, 2017**

The Academic Planning and Priorities Committee met on October 2, 2017.

The Academic Planning and Priorities committee met on October 2, 2017. Being the first meeting of the academic year, the Chair, Dr. Graham Carr had the members introduce themselves and went over the mandate of the committee. Dr. Guylaine Beaudry, Vice-Provost, Digital Strategy and University Librarian gave a presentation on the digital strategy. She gave an overview of the new initiative and sought feedback from the committee on the plan.



**SENATE FINANCE COMMITTEE
REPORT TO SENATE
October 13, 2017**

The first meeting of the Senate Finance Committee (SFC) was held on September 29, 2017. Dr. June Chaikelson was elected as Chair for 2017-2018. The CFO sent his regrets.

Jean-Francois Hamel, Senior Director, Financial Planning & Budgets (on behalf of Denis Cossette), presented a snapshot of the University's financial status. Since 2010-11, Concordia has experienced a cumulative reduction of more than \$90 million in revenues to the operating budget. As a consequence of these reductions, the University has had an operating deficit in the last two years (\$9.3 million in 2015-16 and 5.7 million in 2016-17). In March 2017, the Government of Quebec announced that its budget would include new funding for the university sector; Concordia's share of the new funding is \$3.2 million. Even with the new additional grant the University has projected a deficit of \$3.9 million for the current year, based on revenues of \$473.7 million and expenses of \$477.6 million (bringing the total cumulative deficit to 23.7 million). SFC was told that the 2017-18 budget had been prepared with a clear vision to continue advancing the initiatives under the university's nine strategic directions. Moreover, it focuses on making new investments in the Faculties, identifying strategic allocations, enhancing the student experience, reducing the annual deficit and supporting our strategic directions initiatives. The Finance Committee recommends that the budget presentation be given at Senate.

As the income side of the budget is based on anticipated enrolments, Jonathan Levinson, Executive Director, Institutional Planning and Analysis, presented an enrolment update. The good news is that Concordia units exceeded both the projected enrolment numbers, as well as their 2016 Fall term admission counts. Overall new registrations rose by 4.63%: Graduate by 5.05% and Undergraduate by 4.52%.

Two new programs were also reviewed at the meeting: the Minor in Biophysics and the Minor and Certificate in Immigration Studies. The SFC's mandate is to assist in the costing of new programs and not to comment on the academic merits of the proposals. In general, SFC attempts to resolve the financial aspects of program proposals and have the documents corrected and/or clarified before they get to Senate.

The Minor in Biophysics brings together courses that are already offered by the Faculty so the only additional cost that may be incurred arises out of the need for additional teaching assistants. Although these new costs are added each year in the projected budget, they should be granted to the department when increased enrolments warrant them.

The Minor and Certificate in Immigration Studies are essentially similar programs except that the Certificate program has a 3-credit field placement. The Certificate program will be marketed to both current and future professionals in the field. The degree to which it attracts those “outsiders” will determine whether it covers the projected costs of three new courses. The present faculty will absorb the field placement duties.



COMMITTEE APPOINTMENTS

<u>Committee</u>	<u>Appointee</u>	<u>Term</u>
Academic Planning and Priorities	Mikaela Clark-Gardner (CSU)	2017/2018
	Leyla Sutherland (CSU)	2017/2018
Academic Programs	Omar Riaz (CSU)	2017/2018
	Jonathan Roy (CSU)	2017/2018
Distinguished Professor Emeritus	Dominic Peltier-Rivest (JMSB)	2017/2020
Finance	Reena Atanasiadis (JMSB)	2017/2020
	Rory Blaisdell (CSU)	2017/2018
Library	Mohamed Allalou (CSU)	2017/2018
	Julia Sutura Sardo (CSU)	2017/2018
	Darlene Walsh (JMSB)	2017/2020
Research	Xiao Huang (JMSB)	2017/2020
	Sharon Yonan Renold (CSU)	2017/2018
Special Graduation Awards	Shaumia Suntharalingam (CSU)	2017/2018
Steering Committee	Leyla Sutherland (CSU)	2017/2018
<u>Appointments requiring Senate ratification</u>	<u>Appointee</u>	<u>Term</u>
Faculty Tribunal Pool	Lorrie Blair (SGS)	2017/2018
	Joel Bothello (JMSB)	2017/2019
	Miriam Diaz (SGS)	2017/2018
	Alexey Lyubimov (JMSB)	2017/2019
	Hassan Rivaz (SGS)	2017/2019
	Mahesh Sharma (JMSB)	2017/2019
	Anton Shevchenko (JMSB)	2017/2019
	Steven Stowell (SGS)	2017/2019
	Yuan Wang (JMSB)	2017/2019

October 4, 2017

**ACADEMIC PROGRAMS COMMITTEE
REPORT TO SENATE
Sandra Gabriele, PhD
October 13, 2017**

The Academic Programs Committee requests that Senate consider the following undergraduate change for the 2018-19 Undergraduate Calendar:

Following approval of Faculty Council, on **September 21, 2017**, APC members reviewed the undergraduate curriculum submission from the Faculty of Arts and Science. As a result of discussions APC resolved that the following undergraduate curriculum proposal be forwarded to Senate for approval:

Faculty of Arts and Science

Department of Physics (For May 2018 Implementation) (US-2017-6-D8)

[The proposal involves creating a new program.]

- Minor in Biophysics – **New Program**

The Academic Programs Committee requests that Senate consider the following graduate changes for the Summer 2018 Graduate Calendar:

Following approval of Faculty Council, as well as the Council of the School of Graduate Studies, on **September 21, 2017**, APC members reviewed the graduate curriculum submissions from the Faculty of Engineering and Computer Science. As a result of discussions APC resolved that the following graduate curriculum proposals be forwarded to Senate for approval:

Faculty of Engineering and Computer Science

Department of Electrical and Computer Engineering (For May 2018 Implementation) (US-2017-6-D9)

[The proposal involves converting two slot courses into permanent course offerings, and adding a prerequisite to another course.]

- Doctor of/Doctorate in Philosophy (Electrical and Computer Engineering)
- Master of/Magisteriate in Applied Science (Electrical and Computer Engineering)
- Master of/Magisteriate in Engineering (Electrical and Computer Engineering)
- Course Offerings
- Requirements

Department of Mechanical and Industrial Engineering (For May 2018 Implementation) (US-2017-6-D10)

[The proposal involves converting one slot course into a permanent offering.]

- Doctor of/Doctorate in Philosophy (Industrial Engineering)
- Master of/Magisteriate in Applied Science (Industrial Engineering)
- Master of/Magisteriate in Engineering (Industrial Engineering)
- Course Offering
- Requirements



Sandra Gabriele, PhD
Vice-Provost, Innovation in Teaching and Learning
September 26, 2017

SCHOOL OF GRADUATE STUDIES

To: Sandra Gabriele, Vice-Provost, Innovation in Teaching and Learning

cc: Olivia Ward, University Curriculum Administrator
Brad Nelson, Associate Dean, School of Graduate Studies

From: Joanne Beaudoin, Secretary, Council of the School of Graduate Studies

Date: August 28, 2017

Re: Graduate Curriculum Changes – CSGS May 18, 2017

This is to confirm that at the Council of the School of Graduate Studies meeting of Thursday, May 18, 2017 the following *curriculum changes* were approved:

Faculty of Engineering and Computer Science

- Department of Electrical & Computer Engineering CSGS 1617 5 D2
(ELEC-96) *Doctor of/Doctorate in Philosophy (Electrical & Computer Engineering), Master of/Magisteriate in Applied Science (Electrical & Computer Engineering), Master of/Magisteriate in Engineering (Electrical & Computer Engineering)*
- Department of Mechanical & Industrial Engineering CSGS 1617 5 D4
(MECH-99) *Doctor of/Doctorate in Philosophy (Industrial Engineering), Master of/Magisteriate in Applied Science (Industrial Engineering), Master of/Magisteriate in Engineering (Industrial Engineering)*

The documents can be forwarded to Senate for final approval.

Thank you.



MEMO TO: Paula Wood-Adams
Dean of Graduate Studies

FROM: Brad Nelson, Associate Dean, Academic Programs and Development
School of Graduate Studies

DATE: May 1, 2017

**SUBJECT: GRADUATE CURRICULUM CHANGES (ELEC-96)
(CALENDAR – SUMMER 2018)
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
FACULTY OF ENGINEERING AND COMPUTER SCIENCE**

The Graduate Curriculum Committee (GCC) reviewed the curriculum changes approved by the Faculty of Engineering and Computer Science.

The Department of Electrical and Computer Engineering is adding two new permanent courses ENGR 6412 Autonomy for Mobile Robots and ELEC 6071 Mixed-Signal VLSI for Communication Systems, as well as adding a prerequisite, ELEC 6411 Power Electronics I, to course ELEC 6421 Renewable Energy Systems to ensure students have the necessary background in power electronics.

The GCC approves the proposed curriculum changes with minor edits. I therefore recommend that the Council of the School of Graduate Studies approve and recommend to Senate the above-mentioned curriculum changes in their final form.

A handwritten signature in black ink, appearing to be "A. M. Debbabi", with a long horizontal line extending to the right.

cc: M. Debbabi, Associate Dean, Graduate Programs and Research, Faculty of Engineering and Computer Science
O. Ward, University Curriculum Administrator, Office of the Provost and Vice-President, Academic Affairs

INTERNAL MEMORANDUM

TO: Dr. Bradley Nelson
Chair, Graduate Curriculum Committee
School of Graduate Studies

FROM: Dr. M. Debbabi
Associate Dean, Graduate Programs and Research
Faculty of Engineering and Computer Science

CC: Ms. Frederica Martin
Academic Programs Analyst
School of Graduate Studies

DATE: April 11 2017

RE: **Graduate Curriculum Proposal for the 2018-19 Academic Year**
Faculty of Engineering and Computer Science

At its meeting on April 7th, 2017, the Council of the Faculty of Engineering and Computer Science reviewed and approved, as presented, the creation of two new courses, *ENGR 6412 Autonomy for Mobile Robots* and *ELEC 6071 Mixed-Signal VLSI for Communication Systems*, proposed by the Department of Electrical and Computer Engineering. ENGR 6412 was offered as a slot course in Winter 2016 with a combined registration of 26 students (14 undergraduate and 12 graduate). ELEC 6071 was previously offered as a slot course in 2013 and 2015 with a combined enrolment of 24 (13 undergraduate and 11 graduate) and 20 (four undergraduate and 16 graduate) students registered respectively.

In addition, the prerequisite of *ELEC 6411* is added to *ELEC 6421 Renewable Energy Systems* so that students have sufficient background in electrical power. The new courses will enhance the department's offerings in the areas of integrated circuits and systems control respectively.

Details of the course proposal are indicated and explained in the Department's internal memorandum and Provotrack dossier ELEC-96.

We kindly request that this dossier be placed on the next agenda of the Graduate Curriculum Committee.

Thank you for your consideration of this proposal.



FACULTY OF ENGINEERING
AND COMPUTER SCIENCE

Office of the Dean

INTERNAL MEMORANDUM

TO: Dr. Amir Asif
Chair of the Faculty Council
Faculty of Engineering and Computer Science

FROM: Dr. M. Debbabi
Associate Dean, Graduate Programs and Research
Faculty of Engineering and Computer Science

DATE: March 22, 2017

RE: **Graduate Curriculum Proposal for the 2018-19 Academic Year
Department of Electrical and Computer Engineering (ECE)**

At its meeting on March 21st, 2017, the Engineering and Computer Science Graduate Studies Committee (ECSGSC) reviewed and approved, with minor corrections, the creation of two permanent courses **ENGR 6412 Autonomy for Mobile Robots** and **ELEC 6071 Mixed-Signal VLSI for Communication Systems**, which were previously offered as slot courses. Furthermore, the prerequisite of *ELEC 6411 Power Electronics I* has been added to **ELEC 6421 Renewable Energy Systems** so that students will have the required background in power electronics. The addition of the new courses will enhance the Department's course offerings in the areas of systems and control and application-specific integrated circuit (ASIC). The proposed courses are especially important to the thesis students conducting advanced research in the said areas of research.

Details of this curriculum package are indicated and explained in the Department's internal memorandum and Provotrack dossier ELEC-96.

We kindly request that this item be placed on the next agenda of the Faculty Council for approval.

Thank you for your consideration of this proposal.

DATE: March 16, 2017

TO: Dr. M. Debbabi, Associate Dean, Research and Graduate Studies
Faculty of Engineering and Computer Science

FROM: Dr. W.E. Lynch, Chair
Department of Electrical and Computer Engineering

SUBJECT: **Graduate Changes - 2018**

Please find enclosed Dossier #96 submitted by the Department of Electrical and Computer Engineering.

This curriculum package is aimed at upgrading the Electrical & Computer Engineering Program. The package consists of the addition of a prerequisite to **ELEC 6421**, as well as the creation of two new courses **ELEC 6071** and **ENGR 6412** to be listed in the Topic Areas **E03 Systems and Control** and **F03 Application Specific Integrated Circuits** respectively.

ELEC 6421 Renewable Energy Systems

The Department proposed to add *ELEC 6411 Power Electronics I* as a prerequisite to **Renewable Energy Systems**. The focus of the change is that students admitted to the MEng program in Electrical and Computer did not have any power knowledge. All students registering in ELEC 6411 will now have the required background in power electronics.

ELEC 6071 Mixed-Signal VLSI for Communication Systems

Within the area of integrated circuit design, we currently have ELEC 6051 Introduction to Analog VLSI, which is the classic graduate level course in analog design. The opamp is the prototypical circuit of this course. We also have ELEC 6081 Modern Analog Filter Design which covers material associated with one of the most important application areas of analog integrated circuits, namely analog filtering. The proposed course ELEC 6071 is an entry-level graduate course, requiring Electronics II as a prerequisite. In general our undergraduate students who have completed Electronics II are on par with students in the MEng program. Therefore, it is reasonable to open it up to both grad and undergraduate cohorts. The graduate students will do additional work in the class tests and assignments. Also, the graduate students' projects will be more involved, dealing with larger portions of the communication system and taking the design further by including the completed integrated circuit layout and post-layout simulation.

ENGR 6412 Autonomy for Mobile Robots

This course is meant to expand the programs' offerings in robotics, which is a growing field. The techniques presented in this class, probabilistic filters for state estimation, are also broadly important in the larger area of systems and control. After taking this course, students should have a clear understanding of the sources and implications of uncertainty inherent to robotic measurements and actions. They should be able to apply a suite of specialized engineering concepts (probabilistic filters) to autonomously track the state of a robot (i.e. its location) and the world it is interacting with (i.e. a map). The topic area for this course is E03. The course is cross-listed with ELEC 473 and it was offered as a slot course in Winter 2016 with a combined registration of 26 students (14 undergraduates and 12 graduates). The combined section capacity was 60 students.

These graduate changes have been approved at the Department Curriculum Committee meetings held on December 5, 2016, November, 2016, February 13, 2017 and at the Department Council meeting held on March 3, 2017.

I would be grateful if you could put this on the agenda of the next ENCS Graduate Studies Committee meeting.

PROGRAM CHANGE: TOPIC AREAS E03, F03

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Department of Electrical and Computer Engineering
Program: Electrical and Computer Engineering
Degree: MEng, MAsc, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

Editorial Requirements Regulations Program Deletion New Program

Present Text (from 2017/2018) calendar	Proposed Text
<p style="text-align: center;">List of Courses by Topic Areas</p> <p>E03 - SYSTEMS AND CONTROL</p> <p>ELEC 6041 Large-scale Control Systems ELEC 6061 Real-time Computer Control Systems ELEC 6091 Discrete Event Systems ENGR 6071 Switched and Hybrid Control Systems ENGR 6131 Linear Systems (*) ENGR 6141 Nonlinear Systems ENGR 7121 Analysis and Design of Linear Multivariable Systems ENGR 7131 Adaptive Control ENGR 7181 Digital Control of Dynamic Systems MECH 6681 Dynamics and Control of Nonholonomic Systems</p> <p>F03 - APPLICATION SPECIFIC INTEGRATED CIRCUITS</p> <p>COEN 6501 Digital System Design and Synthesis COEN 6511 VLSI Circuit Design COEN 6521 Design for Testability COEN 6531 ASIC Synthesis COEN 6541 Functional Hardware Verification COEN 6551 Formal Hardware Verification ELEC 6051 Introduction to Analog VLSI ELEC 6081 Modern Analog Filter Design</p>	<p style="text-align: center;">List of Courses by Topic Areas</p> <p>E03 - SYSTEMS AND CONTROL</p> <p>ELEC 6041 Large-scale Control Systems ELEC 6061 Real-time Computer Control Systems ELEC 6091 Discrete Event Systems ENGR 6071 Switched and Hybrid Control Systems ENGR 6131 Linear Systems (*) ENGR 6141 Nonlinear Systems ENGR 6412 Autonomy for Mobile Robots (*) ENGR 7121 Analysis and Design of Linear Multivariable Systems ENGR 7131 Adaptive Control ENGR 7181 Digital Control of Dynamic Systems MECH 6681 Dynamics and Control of Nonholonomic Systems</p> <p>F03 - APPLICATION SPECIFIC INTEGRATED CIRCUITS</p> <p>COEN 6501 Digital System Design and Synthesis COEN 6511 VLSI Circuit Design COEN 6521 Design for Testability COEN 6531 ASIC Synthesis COEN 6541 Functional Hardware Verification COEN 6551 Formal Hardware Verification ELEC 6051 Introduction to Analog VLSI ELEC 6071 Mixed-Signal VLSI for Communciation Systems (*) ELEC 6081 Modern Analog Filter Design</p>

Rationale:

The topic areas reflect the addition of the new courses.

Resource Implications:

None.

COURSE CHANGE: ELEC 6071 New Course Number:

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Department of Electrical and Computer Engineering
Program: Electrical and Computer Engineering
Degree: MEng, MAsc, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

- | | | | |
|---|---|--|---------------------------------------|
| <input type="checkbox"/> Course Number | <input type="checkbox"/> Course Title | <input type="checkbox"/> Credit Value | <input type="checkbox"/> Prerequisite |
| <input type="checkbox"/> Course Description | <input type="checkbox"/> Editorial | <input checked="" type="checkbox"/> New Course | |
| <input type="checkbox"/> Course Deletion | <input type="checkbox"/> Other - Specify: | | |

Present Text (from 20xx/20xx) calendar	Proposed Text
	<p>ELEC 6071 Mixed-Signal VLSI for Communication Systems (*) (4 credits) Topics include overview of wireline communication links, mechanisms of signal degradation, modulation formats, TX/RX synchronization options, IC technology limitations, transmitter front-end circuits, receiver front-end circuits, decision circuits, clock and data recovery systems, phase-locked loops, jitter, continuous-time and discrete-time equalizers, system metrics. A project is required. Note: Students who have received credit for ELEC 691N (Mixed-Signal VLSI for Communication Systems) may not take this course for credit.</p>
<p>Rationale: This course has been offered as a slot course twice with a combined enrolment of about 20 students. In 2015-16 academic year, there were 13 undergraduate and 11 graduate students registered. In 2013-14 academic year, there were four (4) undergraduate and 16 graduate students registered. The capacity of the course is 24 students. This course addresses the circuit level implementation of high-speed wired communication links. The circuits and systems discussed in this course are in all high-speed electrical links. This course fills a much needed gap in our curriculum. Therefore, it is reasonable to open it up to both graduate and undergraduate students. This course is cross-listed with ELEC 413 and belongs in group F03.</p>	
<p>Resource Implications: The course will be part of a faculty member's teaching load and drawn from our current course allotment.</p>	
<p>Other Programs within which course is listed: None.</p>	

COURSE CHANGE: ELEC 6421 New Course Number:

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Department of Electrical and Computer Engineering
Program: Electrical and Computer Engineering
Degree: MEng, MAsc, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

- | | | | |
|--|---|---------------------------------------|--|
| <input type="checkbox"/> Course Number | <input type="checkbox"/> Course Title | <input type="checkbox"/> Credit Value | <input checked="" type="checkbox"/> Prerequisite |
| <input checked="" type="checkbox"/> Course Description | <input type="checkbox"/> Editorial | <input type="checkbox"/> New Course | |
| <input type="checkbox"/> Course Deletion | <input type="checkbox"/> Other - Specify: | | |

Present Text (from 2017/2018) calendar	Proposed Text
<p>ELEC 6421 Renewable Energy Systems (*) (4 credits) This course covers electrical basics and models of solar energy (photo-voltaics); electrical power from wind energy (including turbine operation); electrical power from wave and tidal energy; electrical power from micro-hydro and biomass waste to energy. Fundamental energy equations will be derived from physics and the electrical power equations developed. Engineering design implications will be discussed. Design assignments are given to reinforce the engineering design based on fundamental physics. A project.</p> <p>Note: Students who have received credit for ELEC 691Z (Renewable Energy Systems) may not take this course for credit.</p>	<p>ELEC 6421 Renewable Energy Systems (*) (4 credits) <u>Prerequisite: ELEC 6411.</u> This course covers electrical basics and models of solar energy (photo-voltaics); electrical power from wind energy (including turbine operation); electrical power from wave and tidal energy; electrical power from micro-hydro and biomass waste to energy. Fundamental energy equations will be derived from physics and the electrical power equations developed. Engineering design implications will be discussed. Design assignments are given to reinforce the engineering design based on fundamental physics. A project <u>is required.</u></p> <p>Note: Students who have received credit for ELEC 691Z (Renewable Energy Systems) may not take this course for credit.</p>
<p>Rationale: Students need a power background for this course as reflected by the addition of the prerequisite ELEC 6411 Power Electronics I.</p>	
<p>Resource Implications: None.</p>	
<p>Other Programs within which course is listed: None.</p>	

COURSE CHANGE: ENGR 6412 New Course Number:

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Department of Electrical and Computer Engineering
Program: Electrical and Computer Engineering
Degree: MEng, MAsc, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

- | | | | |
|---|---|--|---------------------------------------|
| <input type="checkbox"/> Course Number | <input type="checkbox"/> Course Title | <input type="checkbox"/> Credit Value | <input type="checkbox"/> Prerequisite |
| <input type="checkbox"/> Course Description | <input type="checkbox"/> Editorial | <input checked="" type="checkbox"/> New Course | |
| <input type="checkbox"/> Course Deletion | <input type="checkbox"/> Other - Specify: | | |

Present Text (from 20xx/20xx) calendar	Proposed Text
	<p>ENGR 6412 Autonomy for Mobile Robots (*) (4 credits) Topics include application of autonomous wheeled robots: autonomous cars, indoor robots, (off-road) unmanned ground vehicles; robot motion models, robot odometry; robot sensor models: beam models of range finders, feature-based measurement models; occupancy grid mapping; the Bayes Filter; the Kalman filter; the particle filter; robot localization: particle filter localization, Kalman filter localization; introduction to simultaneous localization and mapping (SLAM). A project is required. Note: Students who have received credit for ELEC 691 MM (Autonomy for Mobile Robots) may not take this course for credit.</p>
<p>Rationale: The course is of interest to both graduate and senior undergraduate students. The technical content is at a level that is appropriate for both, though the graduate students are expected to go deeper into the material independently. The main difference between the versions is the emphasis of the final project. For the undergraduate students this project is basically another assignment on material covered in class. For the graduate students they must demonstrate going beyond the class material (to include chapters not covered and/or scholarly articles) and incorporating independent work and/or research.</p> <p>This course is cross-listed with ELEC 473. The course was offered as a slot course in Winter 2016 with a combined registration of 26 students (14 undergraduate and 12 graduate). The combined section capacity was 60 students.</p> <p>This course would go under topic area E03 Systems and Control.</p>	
<p>Resource Implications: The course will be part of a faculty member's teaching load and drawn from our current course allotment.</p>	
<p>Other Programs within which course is listed: None.</p>	

SCHOOL OF GRADUATE STUDIES

To: Sandra Gabriele, Vice-Provost, Innovation in Teaching and Learning

cc: Olivia Ward, University Curriculum Administrator
Brad Nelson, Associate Dean, School of Graduate Studies

From: Joanne Beaudoin, Secretary, Council of the School of Graduate Studies

Date: August 28, 2017

Re: Graduate Curriculum Changes – CSGS May 18, 2017

This is to confirm that at the Council of the School of Graduate Studies meeting of Thursday, May 18, 2017 the following *curriculum changes* were approved:

Faculty of Engineering and Computer Science

- Department of Electrical & Computer Engineering CSGS 1617 5 D2
(ELEC-96) *Doctor of/Doctorate in Philosophy (Electrical & Computer Engineering), Master of/Magisteriate in Applied Science (Electrical & Computer Engineering), Master of/Magisteriate in Engineering (Electrical & Computer Engineering)*
- Department of Mechanical & Industrial Engineering CSGS 1617 5 D4
(MECH-99) *Doctor of/Doctorate in Philosophy (Industrial Engineering), Master of/Magisteriate in Applied Science (Industrial Engineering), Master of/Magisteriate in Engineering (Industrial Engineering)*

The documents can be forwarded to Senate for final approval.

Thank you.



MEMO TO: Paula Wood-Adams
Dean of Graduate Studies

FROM: Brad Nelson, Associate Dean, Academic Programs and Development
School of Graduate Studies

DATE: May 1, 2017

**SUBJECT: GRADUATE CURRICULUM CHANGES MECH-99)
(CALENDAR –SUMMER 2018)
DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
FACULTY OF ENGINEERING AND COMPUTER SCIENCE**

The Graduate Curriculum Committee (GCC) reviewed the curriculum changes approved by the Faculty of Engineering and Computer Science.

The Department of Mechanical and Industrial Engineering wishes to introduce one new course INDU 6371 Stochastic Optimization that was formerly offered as a slot course.

The GCC approves the proposed curriculum changes with minor edits. I therefore recommend that the Council of the School of Graduate Studies approve and recommend to Senate the above-mentioned curriculum changes in their final form.

A handwritten signature in black ink, appearing to be "A. M. Nelson", written over a horizontal line.

cc: M. Debbabi, Associate Dean, Graduate Programs and Research, Faculty of Engineering and Computer Science
O. Ward, University Curriculum Administrator, Office of the Provost and Vice-President, Academic Affairs

INTERNAL MEMORANDUM

TO: Dr. Bradley Nelson
Chair, Graduate Curriculum Committee
School of Graduate Studies

FROM: Dr. M. Debbabi
Associate Dean, Graduate Programs and Research
Faculty of Engineering and Computer Science

CC: Ms. Frederica Martin
Academic Programs Analyst
School of Graduate Studies

DATE: April 11 2017

RE: **Graduate Curriculum Proposal for the 2018-19 Academic Year
Faculty of Engineering and Computer Science**

At its meeting on April 7th, 2017, the Council of the Faculty of Engineering and Computer Science reviewed and approved, as presented, the creation of a new course, *INDU 6371 Stochastic Optimization*, proposed by the Department of Industrial and Mechanical Engineering. The course was previously offered three times as a slot course in 2013, 2015 and 2017 with 24, 10 and 14 students registered respectively. The proposed course will enhance the department's offerings in the industrial engineering curriculum and will attract students from other universities.

Details of the course proposal are indicated and explained in the Department's internal memorandum and Provotrack dossier MECH-99.

We kindly request that this dossier be placed on the next agenda of the Graduate Curriculum Committee.

Thank you for your consideration of this proposal.



**FACULTY OF ENGINEERING
AND COMPUTER SCIENCE**

Office of the Dean

INTERNAL MEMORANDUM

TO: Dr. Amir Asif
Chair of the Faculty Council
Faculty of Engineering and Computer Science

FROM: Dr. M. Debbabi
Associate Dean, Graduate Programs and Research
Faculty of Engineering and Computer Science

DATE: March 22, 2017

RE: **Graduate Curriculum Proposal for the 2018-19 Academic Year
Department of Mechanical and Industrial Engineering (MIE)**

At its meeting on March 21st, 2017, the Engineering and Computer Science Graduate Studies Committee (ECSGSC) reviewed and approved, as presented, the creation of a new permanent course **INDU 6371 Stochastic Optimization**, which was previously offered as a slot course. The addition of a new course will enhance the Department's course offerings in the area of industrial engineering. The proposed course is especially important to the thesis students conducting advanced research in stochastic optimization.

Details of this curriculum package are indicated and explained in the Department's internal memorandum and Provotrack dossier MECH-99.

We kindly request that this item be placed on the next agenda of the Faculty Council for approval.

Thank you for your consideration of this proposal.

INTERNAL MEMORANDUM

TO: Dr. M. Debabbi,
Associate Dean
Research & Graduate Studies
Engineering & Computer Science

FROM: Dr. A. Dolatabadi,
Graduate Program Director
Department of Mechanical and Industrial Engineering

DATE: February 28th, 2017

SUBJECT: New Course – INDU 6371 Stochastic Optimization

The Department of Mechanical and Industrial Engineering proposes a new elective course *INDU 6371 Stochastic Optimization*. This course has been approved by the MIE Department.

It was suggested during the Department Graduate Studies and Curriculum Committee and MIE Department meetings that the proposed course be offered as a permanent course on a regular basis. This was unanimously approved.

Stochastic Optimization deals with decision-making optimization models that incorporate random parameters; hence it fits well into the curriculum of Industrial Engineering. Students will learn stochastic programming and robust optimization concepts in addition to algorithms for solving these models. They will also review the application of stochastic optimization models in various decision-making problems. The course provides a knowledge-base on stochastic optimization models, algorithms and applications to students. The course project is expected to improve students' skills in problem-solving and analysis with the aid of stochastic optimization.

PROGRAM CHANGE: Topic Area E12

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Mechanical and Industrial Engineering
Program: Industrial Engineering
Degree: MEng, MAS, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

Editorial Requirements Regulations Program Deletion New Program

Present Text (from 2017/2018) calendar	Proposed Text
<p>E12 - INDUSTRIAL ENGINEERING INDU 6111 Theory of Operations Research INDU 6121 Advanced Operations Research INDU 6131 Graph Theory with System Applications INDU 6141 Logistics Network Models (*) INDU 6151 Decision Models in Service Sector (*) INDU 6211 Production Systems and Inventory Control INDU 6221 Lean Enterprise INDU 6231 Scheduling Theory INDU 6241 Lean Manufacturing INDU 6311 Discrete System Simulation INDU 6321 Introduction to Six Sigma (*) INDU 6331 Advanced Quality Control INDU 6341 Advanced Concepts in Quality Improvement (*) INDU 6351 System Reliability INDU 6411 Human Factors Engineering (*) INDU 6421 Occupational Safety Engineering (*)</p>	<p>E12 - INDUSTRIAL ENGINEERING INDU 6111 Theory of Operations Research INDU 6121 Advanced Operations Research INDU 6131 Graph Theory with System Applications INDU 6141 Logistics Network Models (*) INDU 6151 Decision Models in Service Sector (*) INDU 6211 Production Systems and Inventory Control INDU 6221 Lean Enterprise INDU 6231 Scheduling Theory INDU 6241 Lean Manufacturing INDU 6311 Discrete System Simulation INDU 6321 Introduction to Six Sigma (*) INDU 6331 Advanced Quality Control INDU 6341 Advanced Concepts in Quality Improvement (*) INDU 6351 System Reliability INDU 6371 Stochastic Optimization INDU 6411 Human Factors Engineering (*) INDU 6421 Occupational Safety Engineering (*)</p>
<p>Rationale: The change reflects the addition of a new course.</p>	
<p>Resource Implications: None</p>	

COURSE CHANGE: INDU 6371 New Course Number:

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Engineering and Computer Science
Department: Mechanical and Industrial Engineering
Program: Industrial Engineering
Degree: MEng, MAsc, PhD
Calendar Section/Graduate Page Number: Fall 2017

Type of Change:

- | | | | |
|---|---|--|---------------------------------------|
| <input type="checkbox"/> Course Number | <input type="checkbox"/> Course Title | <input type="checkbox"/> Credit Value | <input type="checkbox"/> Prerequisite |
| <input type="checkbox"/> Course Description | <input type="checkbox"/> Editorial | <input checked="" type="checkbox"/> New Course | |
| <input type="checkbox"/> Course Deletion | <input type="checkbox"/> Other - Specify: | | |

Present Text (from 20xx/20xx) calendar	Proposed Text
	<p>INDU 6371 Stochastic Optimization (4 credits) <i>Prerequisite:</i> INDU 6111. Topics include an overview of stochastic optimization models; two-stage and multi-stage stochastic programming; algorithms for solving large-scale stochastic programming models, including sample average approximation (SAA), L-shaped method and scenario decomposition algorithms; robust optimization approach. A project is required. Note: Students who have received credit for the course INDU 691X (Stochastic Optimization) may not take this course for credit.</p>
<p>Rationale: INDU 691 was initially proposed in 2013 as a response to the increasing demand of Industrial Engineering (IE) PhD students for learning stochastic optimization approaches. So far, the course has been offered in 2013, 2015 and 2017 with 24, 10 and 14 registered students respectively. The course capacity is 40 students Since this course is the only one offered on this topic in English in the province of Quebec and due to its relevance to the majority of IE PhD thesis topics, it has been attracting PhD and MAsc students from other departments at Concordia as well as from other universities in Montreal and Quebec City. Including "stochastic optimization" in the INDU curriculum as a permanent course, will improve the quality of the INDU graduate programs and make them more attractive to the local and international applicants.</p>	
<p>Resource Implications: The course will be part of a faculty member's teaching load and drawn from our current course allotment.</p>	
<p>Other Programs within which course is listed: None.</p>	

INTERNAL MEMORANDUM

TO: Dr Sandra Gabriele, Vice-Provost, Innovation in Teaching and Learning
Office of the Provost and Vice-President, Academic Affairs
Chair, Academic Programs Committee

FROM: Dr André Roy, Dean, Faculty of Arts and Science
Chair, Arts and Science Faculty Council

DATE: August 25, 2017

SUBJECT: Undergraduate Calendar Curriculum Changes
Department of Physics
PHYS-19
Minor in Biophysics

The Arts and Science Faculty Council has reviewed and approved the following proposal and requests that it be considered at the next meeting of APC.

The **Department of Physics** is proposing the creation of a Minor in Biophysics. This Minor will bridge the gap between the understanding of the life sciences (from the molecular to the whole organism level) with training in physically and mathematically rigorous approaches to problem solving. It will provide a coherent view of the physical aspects of biological systems.

“This program would offer Concordia’s BSc students in biology, chemistry, biochemistry, exercise science, and psychology a clear and formally recognized path to complement their life science education with more physically and mathematically rigorous knowledge”. Combining this Minor with a Major in the areas mentioned above will give the students the broader perspective that is important in academia and industry these days “to help the students to develop a sufficient level of understanding and skills in biophysics such that they can fully and productively engage in working as part of a multidisciplinary team which includes biophysicists, mathematicians and physicists”.

The attached proposal addresses the scope of the changes, the objectives of the program and its socio-economic and cultural relevance and outlines the financial implications which have been approved previously in the form of an LOI.

Thank you for your consideration of this proposal.

Department of Physics

PHYS-19

Memo from Chair and Curriculum Committee Chair

New Program

Minor in Biophysics

**Program Proposal for a
Minor in Biophysics
Department of Physics
Faculty of Arts and Science
Concordia University**

January 2017

Summary. We propose the creation of a Minor in Biophysics which would be primarily aimed at bridging the gap in academic training between the physical and biological sciences for BSc science major students (not registered in a physics or biophysics major). This Minor in Biophysics will offer a coherent overview of the physical aspects of biological systems from the molecular level up to the human body systems. Moreover, this new program will complement the science training of BSc students with physically and mathematically rigorous approaches to problem solving, modeling and data analysis. The curriculum of the program is made of 24 credits from existing courses in physics, biophysics, biology and mathematics. The only resource needed is a modest TA budget to support the increased enrolment in the existing PHYS courses. We received written confirmations (attached) from the undergraduate program directors of Biology (BIOL 266) and Mathematics and Statistics (MAST 218) that there are sufficient seats available in the required courses from their Departments to support this proposal. Additionally, we attach in the appendix the letters of support from the Chairs of the Departments of Biology (Dr. Gulick) and Chemistry and Biochemistry (Dr. DeWolf) supporting our proposal.

SECTION 1 PROGRAM IDENTIFICATION

1.1 Program Title and Level

The proposed program is titled “**Minor in Biophysics**” and is intended for non-physics BSc students interested in enhancing their knowledge and problem solving skills in physics and especially in biophysics.

1.2 Areas of Specialization

The area of specialization is Biophysics. This area is at the intersection between biology and physics. It describes the physics of biological systems, ranging in size from single-molecules up to human-sized organisms.

1.3 Administrative Location

Most of the courses of this Minor would be offered by the Department of Physics, Faculty of Arts and Science, on the Loyola Campus. One course would be offered by the Department of Mathematics and Statistics (MAST 218) and one course by the Department of Biology (BIOL 266). The program would be administered by the Department of Physics.

SECTION 2 PROGRAM OBJECTIVES

2.1 Theoretical Foundations and Academic Aims

The boundaries between different science disciplines are getting ever more transparent due to the interdisciplinary nature of modern science and technological challenges. Over the last decade there have been major developments in academia and industry connecting physics theory, and physics instrumentation/methods to biochemistry and biology problems ranging from genetics, to drug development and brain imaging. There is an increasing demand for science professionals with rigorous training across several disciplines, including physics. With the creation of this minor we aim to bridge a significant gap currently present in the science curriculum at Concordia between the physical and biological sciences. This program would offer Concordia's BSc students in biology, chemistry, biochemistry, exercise science, and psychology a clear and formally recognized path to complement their life science education with more physically and mathematically rigorous knowledge. Students in other disciplines, such as mathematics and electrical and computer engineering, may also be interested in this program to expand their knowledge of biology as well as physics. This Minor in Biophysics will offer a coherent overview of the physical aspects of biological systems focusing on topics such as: the mathematical methods of physics to solve systems of linear equations, differential equations and vector integrals, the physics and biophysics of optical imaging, a rigorous description of electricity and thermodynamics, biophysical modeling, understanding the interconnections between biophysics, organic chemistry and biology in cells and human systems.

2.2 Specific Knowledge, Expertise and Skills (Learning Outcomes)

The first key outcome of this Minor in Biophysics program will be the development of a sound physical and mathematical understanding in the context of life science. It will include the ability to solve a wide variety of applied problems in biophysical systems as well as physical, chemical and biological systems. The acquired skillset will enhanced the students' expertise and creativity in quantitative data analysis, modeling and numerical methods.

The second objective is to provide a deeper knowledge of specific physics subjects that are particularly relevant to state-of-the-art biophysics, biology, and biochemistry research and professional work. This includes both purely theoretical concepts (electricity and magnetism, thermodynamics) and understanding of a wide range of biophysical and biomedical physics techniques and instruments (optics, medical imaging).

The third main objective is to help the students to develop a sufficient level of understanding and skills in biophysics such that they can fully and productively engage in working as part of a multidisciplinary team which includes biophysicists, mathematicians and physicists.

SECTION 3 RATIONALE FOR THE PROPOSAL

3.1 Socioeconomic and Cultural Relevance

Biology studies life in all of its variety and complexity. It describes how organisms go about finding food, communicating, sensing the environment, and reproducing. On the other hand, physics uses experiments and mathematics to discover the fundamental laws of nature and make detailed predictions about the forces and energy that drive simple systems. Integrating the complexity of life and the simplicity of physical laws is the challenge of biophysics. Looking for patterns in life science and analyzing them with the toolbox provided by mathematics and physics is a powerful way to gain new insights. Biophysicists study nature at every level, from atoms and molecules to cells, organisms, and whole environments. As innovations come out of physics and biology labs, biophysicists find new areas where they can apply their dual expertise to solve impactful problems and create applied and theoretical tools.

In the 20th century, great progress was made in treating diseases. Biophysics helped create powerful vaccines against infectious diseases, described and controlled diseases of metabolism, such as diabetes, and provided tools and understanding for treating the diseases of growth known as cancers. Biophysics gave us medical imaging technologies including MRI, CAT scans, PET scans, and sonograms for diagnosing diseases. It also provided the life-saving treatment methods of kidney dialysis, radiation therapy, cardiac defibrillators, and pacemakers.

Besides medical-related subjects, biophysics contributes to solving other physical and biological problems of global significance that our society is currently facing. How will we continue to produce sufficient energy while reducing pollution? How can we feed the world's population? How do we remediate or mitigate global warming? How do we preserve biological diversity? How do we secure clean water for all humans? How do we prevent terrorist attacks? These are problems

that require various biophysical insights and innovations based on a solid understanding of the principles of physics as applied to the mechanisms of biology.

To give a concrete example of the economic impact of biophysics, consider that biophysicists invented the instruments for detecting, purifying, imaging, and manipulating various chemicals and materials of biological importance. These advanced biophysical research instruments are the workhorses of drug development in the pharmaceutical and biotechnology industries. Since the 1970's, biotechnology companies have been earning more than \$60 billion per year using these technologies.

3.2 Detailed Needs Analysis

The key motivation for this proposal is to address an already existing demand. Concordia has several large Science Departments servicing a few thousand students, but there is currently not a single Minor offered by the Department of Physics. Given the extensive biology connections of the curriculums in the Departments of Biology, Chemistry and Biochemistry, Exercise Science and Psychology, it makes sense to develop a Minor in Biophysics to offer a natural complement between the BSc training in the other Science Departments and our Department of Physics. There is also an emerging need for a complementary biophysics training in the Department of Electrical and Computer Engineering where students increasingly seek training in biomedical engineering.

Over the last several years, our BSc physics programs have become significantly more populated and interdisciplinary. This has led to an increased awareness of our department among other science students. Numerous non-physics science students have expressed to us their interest in taking a Minor in physics or biophysics. Moreover, the 1500+ students per year in our 200-level general physics courses (PHYS 204, 205 and 206 for Science and ENCS students) constitute a large recruitment pool for this program and will secure a satisfactory enrolment. We will actively promote this new program by directly and regularly informing the academic advisors in the Science and ENCS Departments.

As described in the appended budget table, we expect the total enrolment of this Minor to grow from around 15 students in the first year of existence of the program to 30, and 50 in the second and third year. After the third year, the growth is expected to continue steadily and the total enrolment should reach around 60 by the fifth year of the program.

3.3 Evolution of Training Requirements

Historically, after the departure from the “Natural Philosophy” model, most natural science disciplines have been developing relatively independently from each other for centuries. This independent development is also reflected in the formal structures within academia. As a result, different cultures have emerged within different disciplines, which often negatively affect the flow of ideas between them. While traditional areas such as physics, biology and chemistry continue contributing extremely valuable insights, by the second half of the 20th century it became evident that exciting and important discoveries could be made at the interfaces between these traditional fields. Biochemistry was perhaps the first interdisciplinary science subject to clearly take off, and nearly all institutions of higher education now offer a specialized biochemistry program. Disciplines such as biophysics, neuropsychology, biomedical engineering and others are now rapidly developing. Thus, a need has emerged to establish specialized programs training specialists in these interdisciplinary fields. At Concordia, the BSc Biophysics Specialization program was created in the Department of Physics about 10 years ago.

Unfortunately, as these new interdisciplinary fields mature they themselves are becoming very specialized and difficult to approach without a formal training. There is a high demand for people who can meaningfully bridge the gaps between these new specializations (biophysics) and the traditional fields (biology, biochemistry, chemistry, ECE, exercise science, psychology). *Adding a Minor to a student’s Major is a recognized vehicle to achieve this bridging of expertise between two fields.* Specifically, the proposed Minor in Biophysics will add further training in quantitative science modeling and analysis to the traditional training in biological sciences. Equally

importantly, it will offer the trainees a different conceptual approach (physics approach) to problem-solving.

3.4 Existence of Similar Programs

While the number of universities offering a Minor in Physics is relatively large (University of Ottawa, University of British Columbia, McMaster University, McGill University, University of Waterloo, Ryerson University, etc....), only a few universities (University of Ottawa, University of Waterloo and University of Western Ontario) offer Minors in Biophysics or Biomedical physics. Given the existing programs and expertise at Concordia, we find that a Minor in Biophysics is the most needed new physics program. It will help to build a competitive Concordia science sector by providing distinctive skills and expertise to our students interested in either graduate research or industry work in the biological sciences. Concordia would be the only English-language University in Quebec offering a Minor in Biophysics.

3.5 Institutional Relevance (strategic plan and fit with other programs)

Concordia University has thriving programs in Biology, Neuroscience, Exercise Science, Chemistry and Biochemistry as well as rapidly growing and strong Physics programs. However, at the moment there are only a limited number of courses offering rigorous physical and mathematical approaches to life sciences students outside the Department of Physics (e.g. CHEM 335 Biophysical Chemistry, and a few specialized higher-level courses). We intend on giving non-physics students a structured opportunity to explore biophysics and physics, but with a much smaller time commitment than a Biophysics Specialization (or the proposed joint Biology-Engineering Major).

This Minor in Biophysics addresses several areas outlined in the Concordia Strategic Directions document. In the spirit of “Teaching for Tomorrow” we are offering students the knowledge and training in quantitative and analytical thinking that will be needed in their future employment. We also strongly believe that students choosing this Minor will positively affect research capabilities

of other departments and the overall reputation of Concordia. This program will significantly foster interactions between different disciplines (“Mix it up”).

This proposal is also directly in line with the “Grow smartly” direction as it creates a new program for an already existing demand, which is aligned with our current research and teaching strengths, and where existing capacity is sufficient to address the program needs (no new sections are needed). A Minor in Biophysics can equip our students with the critical thinking, modeling, and multidisciplinary science skills that provide a strong and distinctive complement to any science major.

3.6 Prospects for Graduates

The graduates from this program will be familiar with the physics of biological processes and systems, the working principles of the instrumentation employed in biophysics research, and have developed physics intuition for problem solving. This training will make students specialized in biology, biochemistry and other disciplines more desirable hires in their respective fields. The training acquired in biophysics will also improve the prospects of our graduates for graduate school admission by offering them the skills and confidence to register in a broader range of graduate programs. They will be prime candidates for many research groups pursuing interdisciplinary research.

Many scientific fields have now matured and require workers to develop or use quantitative models (based on biophysics or physics methods). Most employers in the science and engineering sectors have teams of scientists working together on complex problems, and members of these teams need a multidisciplinary scientific training to work productively. Few of our biological sciences graduates are sufficiently fluent in physics to effectively communicate with physicists, mathematicians or physical engineers. The proposed Minor in Biophysics will fill the role of offering our Concordia’s science students the option to acquire (i) a strong command of quantitative and physical modeling in the context of biological sciences (ii) a distinctive and marketable training

in biophysics and multidisciplinary science. A Minor in Biophysics will be useful to graduates pursuing careers in research, technology development, business, government, health care, and in other industries. As a concrete example, in the field of Finance, diffusion-related models used in biophysics are widely employed.

The relevance of the proposed Minor in Biophysics for improving the job prospects and graduate school prospects of our undergraduates in Science and Engineering is made evident when looking at the Government of Canada's recent update (2015) of the "NSERC Strategic Partnership Grants Target Area", which highlights the highest potential fields for job creation and research activities in Canada. To cite only two examples, the description of the Environment and Natural Resources and Energy Target Area states: "*New research and technologies are needed to unlock Canada's enormous economic potential for bioenergy and bioproducts,*" The Agriculture Target Area seeks: "*Methodological frameworks for food-production systems that incorporate holistic modelling and monitoring of biogeochemical interactions*". A knowledge of biophysics and its methods will be a great asset to meet these goals.

The attached letters of support from Dr. DeWolf (Chair of the Department of Chemistry and Biochemistry), Dr. Gulick (Chair of the Department of Biology) further highlight the needs for the creation of the Minor in Biophysics.

SECTION 4 PROGRAM DESCRIPTION AND REQUIREMENTS

4.1 Requirements

The Minor in Biophysics program is intended for students majoring or specializing in Biology, Chemistry and Biochemistry, Exercise Science, Neuroscience (Psychology) as well as Mathematics and Engineering. The minor assumes that the students have completed the CEGEP science profile prior to engaging in this minor.

4.2 Program Structure and Schedule

The extent of this Minor in Biophysics is 24 credits and its composition takes into account existing prerequisite relationships and calendar restrictions. This program offers sufficient flexibility to accommodate students interested in either molecular biophysics or biomedical physics, as well as students from non-biological disciplines such as mathematics, engineering or philosophy who would need some additional introduction to biological issues. The program will contain the following courses:

- MAST 218 Multivariable Calculus I¹
- PHYS 232 Methods of Theoretical Physics I or BIOL 266 Cell Biology²
- PHYS 252 Optics
- PHYS 253 Electricity and Magnetism I or PHYS 236 Numerical Methods in Physics
- PHYS 260 Introductory Biophysics
- Three courses
- from PHYS 334 Thermodynamics, PHYS 443 Quantitative Human Systems Physiology³, PHYS 460 Chemical Aspects of Biophysics, PHYS 461 Membrane Biophysics, PHYS 445 Principles of Medical Imaging³

The table below reflects the current distribution of courses between the years and semesters.

	Fall	Winter
Year 1	<ul style="list-style-type: none"> • MAST 218 Multivariable Calculus I¹ • PHYS 232 Methods of Theoretical Physics I and/or BIOL 266 Cell Biology² 	<ul style="list-style-type: none"> • PHYS 252 Optics • PHYS 260 Introductory Biophysics
Year 2	<ul style="list-style-type: none"> • PHYS 236 Numerical Analysis in Physics and/or PHYS 253 Electricity and Magnetism I • PHYS 334 Thermodynamics and/or PHYS 445 Principles of Medical Imaging 	
Year 3	<ul style="list-style-type: none"> • PHYS 334 Thermodynamics and/or PHYS 461 Membrane Biophysics and/or PHYS 445 Principles of Medical Imaging 	<ul style="list-style-type: none"> • PHYS 460 Chemical Aspects of Biophysics and/or PHYS 443 Quantitative Human Systems Physiology

¹ MAST 218 is an obligatory part of all physics programs and a prerequisite for many of the included physics courses. The relationship with the Department of Mathematics concerning this course is well established.

² Students with a biology background are taking BIOL 266 as part of their program requirements, but may instead need additional training on differential equations and their application to typical physics problems (PHYS 232). On the other hand, engineering or math students need additional biology training.

³ With these higher-level courses the students are offered a choice of the subjects for more in-depth exploration, between molecular biophysics and biomedical physics.

4.3 Course Descriptions

BIOL 266 *Cell Biology* (3 credits)

Prerequisite: Cegep Biology 301 or 101-NYA or BIOL 201; 202-NYA or CHEM 205; 202-NYB or CHEM 206. Structure and functions of the cell and its organelles: cytoskeleton, chromosomes, cell cycle and cell division, organelle biogenesis, molecular motors, trafficking of proteins and membranes, signal transduction, trans-membrane transport, cancer, apoptosis. Lectures only.

MAST 218 *Multivariable Calculus I* (3 credits)

Prerequisite: MATH 204 and 205, or equivalent. Vector geometry; lines and planes; curves in \mathbb{R}^n ; vector functions; vector differential calculus; extrema and Lagrange multipliers. Introduction to multiple integrals and coordinate transformations. Problem solving with a symbolic computation system, e.g. MAPLE.

NOTE: Students who have received credit for MATH 264 may not take this course for credit.

PHYS 232 *Methods of Theoretical Physics I* (3 credits)

Prerequisite: MAST 218 previously or concurrently. First-order differential equations, linear and separable equations, integrating factors, applications. Second-order linear differential equations. Fundamental solutions, linear independence, Wronskian. Nonhomogeneous equations, general solution, method of undetermined coefficients, variation of parameters, applications. Power-series solutions of differential equations, examples. Systems of first-order linear equations. Review of linear algebra, diagonalization of matrices, eigenvalues. Lectures only.

PHYS 236 *Numerical Analysis in Physics* (3 credits)

Basic numerical analysis, symbolic and numerical computation and programming with a computer language and/or mathematics software program, curve fitting. Numerical solutions to linear and nonlinear ordinary and partial differential equations, difference equations. Gaussian elimination, LU decomposition, least-square approximation, linear systems of equations. Numerical differentiation and integration.

NOTE: Students may replace this course with MAST 334.

NOTE: Students who have received credit for MAST 334 may not take this course for credit.

PHYS 252 *Optics* (3 credits)

Prerequisite: PHYS 206. Wave equation, phasors, EM waves, linear, circular and elliptical polarization, polariscope, Malus' law, dichroism, polaroid, polarizing Prism, quarter and half wave plates, wave superposition, interference, Young's double slit experiment, Michelson

interferometer, reflectance and transmittance of thin films, interferometers, dispersion, elements of Fourier analysis, diffraction, single slit diffraction, double slit, Fraunhofer and Fresnel limits, diffraction grating, Fresnel diffraction, instruments, introduction to lasers.

NOTE: Students who have received credit for PHYS 352 may not take this course for credit.

PHYS 253 *Electricity and Magnetism I* (3 credits)

Prerequisite: PHYS 205 or equivalent; MAST 218 or equivalent, previously or concurrently.

Electrostatics, Gauss' law, electric potential, curl and divergence of fields, capacitance, RC circuits, Laplace's equation, Legendre equation, method of images, multipole expansion, dielectrics, polarization, dipole moments, electric displacement.

NOTE: See PHYS 293 for laboratory associated with this course.

PHYS 260 *Introductory Biophysics* (3 credits)

Cell physiology; macromolecules and molecular devices; transmission of genetic information; random walks, friction and diffusion; Reynolds number; entropy, temperature and free energy; entropic forces; chemical forces; self-assembly; membranes; active transport; nerve impulses. Overview of experimental techniques: X-ray crystallography; atomic force, electron and optical microscopies; patch-clamp techniques.

NOTE: Students who have received credit for this topic under a PHYS 298 number may not take this course for credit.

PHYS 334 *Thermodynamics* (3 credits)

Prerequisite: PHYS 204 or equivalent; MAST 218, 219 or equivalent. Equation of state, ideal and real gases, thermodynamic surfaces, first law of thermodynamics, isothermal and adiabatic processes, the energy equation, liquefaction of gases, Carnot engine, second law of thermodynamics, entropy, third law, thermodynamic potentials, Clausius-Clapeyron equation, kinetic theory, equipartition of energy, Van der Waals' equation, transport phenomena,

probability and thermal distributions. Lectures only.

NOTE: See PHYS 393 for laboratory associated with this course.

PHYS 443 *Quantitative human systems physiology*

Prerequisite: Open to all in-program Science and Engineering students with a minimum of 45 university credits (not including Cegep-level science prerequisites), or permission of the instructor. This course addresses important concepts of quantitative systems physiology and the physical bases of physiological function in different organ systems. Students become familiar with the structure and functional principles of the main physiological systems, and how to quantify them. These include the nervous, cardiovascular, respiratory and muscular systems. Important biophysical principles and quantitative physiological methods are presented. These include biophysics of muscle contractions, fluid dynamics in the cardiovascular system, respiration gas exchange and neuronal communication, and how the biophysics of neuronal communications can be used to image brain activity.

PHYS 445 *Principles of Medical Imaging*

Prerequisite: Open to all in-program Science and Engineering students with a minimum of 45 university credits (not including Cegep-level science prerequisites), or permission of the instructor. This course introduces the physical principles associated with important medical imaging techniques used in medicine and in neuroscience research. The objective is to cover the whole imaging process in detail starting from the body entities to be imaged (e.g. structure, function, blood flow, neuronal activity), extending to the physical principles of data acquisition and finally the methods used for image data reconstruction. Imaging modalities presented may include X-Ray and Computer Tomography, Magnetic Resonance Imaging, nuclear medicine, ultrasound, electrophysiology and optical imaging techniques.

PHYS 460 *Chemical Aspects of Biophysics* (3 credits)

Prerequisite: PHYS 253; PHYS 334 previously or concurrently. Stabilizing protein structures; bonding and nonbonding interactions; energy profiles; Ramachandran plot; stabilization through protonation-deprotonation. Interaction of macromolecules with solvents. Thermodynamics of protein folding. Ligand binding, Marcus-theory of biological electron transfer. Examples of modern biophysical techniques: electronic spectroscopies (absorption, fluorescence), X-ray absorption spectroscopy, NMR and EPR spectroscopy, IR and Raman spectroscopy, circular dichroism, differential scanning calorimetry.

NOTE: Students who have received credit for PHYS 360 may not take this course for credit.

NOTE: Students enrolled in a BSc Honours or Specialization in Biochemistry may not take this course for credit.

PHYS 461 *Membrane Biophysics* (3 credits)

Prerequisite: BIOL 266; PHYS 460. Fluid dynamics; composition of natural membranes; selection criteria for artificial membranes; phases and phase transitions of lipids; lipid-protein interactions; transport mechanisms across membranes; facilitated diffusion, Michaelis-Menten equation, ion channels, active transport against a concentration gradient, ATPase; origin of membrane potentials; electrogenic ion pumps; experimental methods to measure membrane potentials (patch clamp, optical, radioactive); resting and action potentials.

SECTION 5 FACULTY RESOURCES AND OTHER HUMAN RESOURCES (Needs of the Program)

5.1 Faculty and Intellectual Environment

The Department of Physics already employs four full-time faculty members in the field of Biophysics. They all pursue research, have external funding sources and supervise graduate and undergraduate students. They have diverse expertise covering a broad range of biophysics: soft condensed matter physics, chemistry and chemical engineering, biomedical engineering and physiology. The teaching and research of Drs. Kalman and Zazubovits focus on what is known as molecular biophysics, while Drs. Gauthier and Grova are involved with biomedical applications on humans, and in particular with various modalities of medical imaging. The diversity of backgrounds and past experiences in working with interdisciplinary teams will allow our faculty to successfully address the needs of non-physics students in this proposed Minor in Biophysics. Our biophysics faculty have formal cross-listed appointments with the Departments of Biology, Chemistry and Biochemistry, and Psychology. They have extensive experience with supervising specialization and honours projects of students from these sister departments as well as from the Science College.

The Department of Physics also has several other teaching and research active members in other areas of Physics who have extensive expertise, and can complement the physics training of biophysics students.

5.2 Course sections and Teaching Assistants

The proposed Minor in Biophysics is composed of 24 credits of existing regularly-offered courses which all have sufficient spare capacity. Therefore, *this proposal does not require any additional course allocation.*

The introduction of this Minor will cause a significant growth of enrolment in 200-level courses such as PHYS 232, PHYS 236, PHYS 252 and PHYS 253 to the point where the instructors will need additional help from teaching assistants for grading the extensive homework required in these courses. As detailed in the attached budget, the only resource we are requesting to support this program is \$12,800 (by the third year) of annual TA budget.

Proposed Calendar Text:

24 Minor in Biophysics

9 MAST 218, PHYS 252, PHYS 260

3 Chosen from PHYS 232 or BIOL 266

3 Chosen from PHYS 236 or PHYS 253

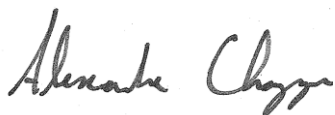
9 Chosen from PHYS 334, PHYS 443, PHYS 445, PHYS 460, PHYS 461

5.3. Chart of Expenses and Revenues

Concordia University		Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Total
FTEs for Yr 1 students	15						-
FTEs for Yr 2 students	30						-
FTEs for Yr 3 students	50						-
FTEs for Yr 4 students	60						-
FTEs for Yr 5 students	60						-
Student Enrolment		-	-	-	-	-	-
Revenue							
Tuition Revenue (\$860.06 per term per FTE x 2 terms)	1,720						-
Teaching grant (base of \$3,465.52/FTE x 2.11)	7,312						-
Variable support grant (per raw FTE \$1,638.61)	1,639	-	-	-	-	-	-
Total Anticipated University Revenue (Only includes teaching & tuition revenue)		-	-	-	-	-	-
Expenses							
Teaching assistantships (\$3200/contract)		3,200	9,600	12,800	12,800	12,800	51,200
Total Anticipated Expenses (Faculty Arts and Science)		3,200	9,600	12,800	12,800	12,800	51,200
Anticipated Gain (Loss) for the University		(3,200)	(9,600)	(12,800)	(12,800)	(12,800)	(51,200)

The proposed Minor in Biophysics has been approved by the Departmental Curriculum Committee on November 9, 2016 and by the Department on January 20, 2017. Thank you for your consideration, and please do not hesitate to contact us if additional information is needed.

Sincerely,



Alexandre Champagne
Chair of the Department




Valter Zazubovits
Curriculum Committee Chair,
Undergraduate Program Director

MEMO

To: Dr. Valter Zazubovits, UPD, Department of Physics
From: Dr Christine DeWolf, Chair, Department of Chemistry and Biochemistry
Date: 15 December 2016
Re: Minor in Biophysics

I am writing to express the support of the Department of Chemistry and Biochemistry for the proposed new Minor in Biophysics that will complement our department's undergraduate programs, providing a more mathematical and quantitative approach to studying biological processes which will appeal to a subset of our biochemistry and chemistry students. The Department of Chemistry and Biochemistry was pleased that our program requirements have been taken into consideration in the design of the program, with options that allow students in a biochemistry program to add this minor (specifically, creating a pathway that does not require BIOL 266, PHYS 334 and PHYS 460, that would overlap with courses already required in our specialization and honours programs). The program options in the field of medical imaging may be of particular interest for our students. The Department of Chemistry and Biochemistry considers this to an important addition to the Physics curriculum which will provide a structured program (rather than just electives) for science students with an interest in adding a biophysics focus to their studies.

Yours sincerely,



Christine DeWolf

From: Patrick J. Gulick <patrick.gulick@concordia.ca>

11/17/16

to Valter, Madoka, Alexandre

Dear Dr. Zazubovits

On behalf of the Biology Department Biology I would like to express our support creation of the Minor in Biophysics, the new program proposed by Department of Physics. Your proposal has been discussed by the departmental curriculum committee and the undergraduate program director, who both felt that this program will complement existing B.Sc. programs and train non-physics BSc students in the field of quantitative bioscience, an emerging interdisciplinary field.

I wish you success with your proposal, and if Biology can assist you in any way do not hesitate to ask.

Sincerely
Patrick Gulick

Dr. Patrick Gulick
Professor, Chair
Biology Department
Concordia University
7141 Sherbrooke St. West
Montreal, Quebec, H4B 1R6
Canada

Phone - Chair [514 848-2424](tel:514-848-2424) ext 3390
Office [514 848-2424](tel:514-848-2424) ext 3407
Fax [514 848-2881](tel:514-848-2881)

Support for minor in Biophysics

Madoka Gray-Mitsumune

Wed 1/18/2017 5:36 PM

To: Valter Zazubovits <valter.zazubovits@concordia.ca>;

Dear Dr. Zazubovits,

This is to confirm that the Biology Department endorses creation of Minor in Biophysics program, targeted at B.Sc. students. This program lists a Biology course, BIOL 266, as a core course. The creation of this program should not create too much burden to BIOL 266, as many students in B.Sc. programs (Biology, Cell Molecular Biology, Ecology, Biochemistry and Psychology) are already taking BIOL 266. We are happy to accommodate additional students in Minor in Biophysics program.

Sincerely,

Madoka Gray-Mitsumune

Madoka Gray-Mitsumune, Ph.D.
Undergraduate Program Director
Department of Biology, Concordia University
7141 rue Sherbrooke O, Montreal QC H4B 1R6, Canada
514-848-2424 ext 4026, madoka.gray-mitsumune@concordia.ca
LinkedIn <https://www.linkedin.com/in/madokagraysmithsumune>
Biology at Concordia Twitter <https://twitter.com/biologyatCU>

Biophysics Minor

Ewa Duma <ewa.duma@concordia.ca>

Mon 1/16/2017 9:41 PM

To: Valter Zazubovits <valter.zazubovits@concordia.ca>;

Cc: Yogen Chaubey <yogen.chaubey@concordia.ca>; Jane Venettacci <jane.venettacci@concordia.ca>; Hal Proppe <hal.proppe@concordia.ca>; Undergraduate Math & Statistics <ugrad.mathstat@concordia.ca>;

Dear Dr. Valter Zazubovits,

After having consulted the Chair of the Department, the Associate Chair, and the Department Administrator, we have collectively agreed to accommodate the Physics Department's interest in setting up a Minor in Biophysics—requiring students to attend MAST 218. Kindly note that the reserved cap will be kept at 5 students per term.

Best regards,

Ewa

Dr. Ewa Duma

Undergraduate Program Director

[Department of Mathematics and Statistics](#)

LB 901-16

PROGRAM CHANGE: Minor in Biophysics

Proposed Undergraduate or Graduate Curriculum Changes

Calendar for academic year: 2018/2019
Implementation Month/Year: May 2018

Faculty/School: Arts and Science
Department: Physics
Program: Minor in Biophysics
Degree:
Calendar Section/Graduate Page Number:31.230

Type of Change:

Editorial Requirements Regulations Program Deletion New Program

Present Text (from 20xx/20xx) calendar	Proposed Text
	<p>24 Minor in Biophysics 9 MAST 218³; PHYS 252³, 260³ 3 Chosen from PHYS 232³ or BIOL 266³ 3 Chosen from PHYS 236³ or 253³ 9 Chosen from PHYS 334³, 443³, 445³, 460³, 461³</p>
<p>Rationale: The Minor in Biophysics offers students a coherent overview of the physical aspects of biological systems, both at the molecular level and the level of the human body. The Minor is based on a CEGEP science profile, i.e. it does not include introductory 200-level courses.</p>	
<p>Resource Implications: Teaching assistantships will come from the Department's TA budget.</p>	



**SENATE
OPEN SESSION
Meeting of October 13, 2017**

AGENDA ITEM: Annual report of the academic hearing panel

ACTION REQUIRED: For information

SUMMARY: The report is presented to Senate in keeping with Article 94 of the Academic Code of Conduct which stipulates:

"An annual report detailing the number and type of charges laid under this Academic Code of Conduct and their disposition shall be prepared by the Secretary of the Tribunals and presented to Senate by September 30 of each year. The report shall be published on the University's website. In no circumstances shall any mention be made of the names of the students involved or of any information, which might lead to their identification."

PREPARED BY:

Name: Danielle Tessier
Date: September 27, 2017

Office of Student Tribunals Annual Academic Hearing Report Summer 2016 to Winter 2017 terms

In accordance with Article 94 of the Academic Code of Conduct (the “Code”), this report details the number and type of charges laid under the Code and their disposition and is presented at the September meeting of Senate. In addition, enclosed herewith is a table with the breakdown of the type of charges laid under the Code (schedule A).

The specific breakdown by Faculty for 2016-2017 as at July 1, 2017 is provided below:

Faculty	INCIDENT REPORTS	CHARGES DISMISSED AT FACULTY LEVEL		CHARGES UPHELD AT FACULTY LEVEL		TOTAL HEARING REQUESTS				TOTAL AHP's HELD		
			% of incident reports		% of incident reports	SENT TO AHP BY FACULTY	AHP REQUESTED BY STUDENT	AHP ¹ PENDING FROM PREVIOUS YEARS	WITH-DRAWN	DISMISSED	UPHELD	AHP PENDING
Arts and Science	162	34	21%	128	79%	3	2	6	1	1	5	4
Engineering and Computer Science	48	3	6%	43	90%	4	3	5	1	0	2	9
Fine Arts	15	6	40%	9	60%	0	0	0	0	0	0	0
John Molson School of Business	109	40	37%	60	55%	1	1	4	2	1	2	1
School of Graduate Studies	31	3	10%	24	77%	2	2	6	1	1	4	4
TOTAL	365	86	24%	264	72%	10	8	21	5	3	13	18
						18				16		

By July 1, 2017, a total of 365 **incidents** were reported for courses taken during the academic period covered by this report. A total of 264 (72%) charges were upheld at the faculty level, 86 (24%) charges were dismissed, 10 files were sent directly to Academic Hearing Panels (“AHP”) and 15 (4%) of these incidents are still pending decisions by the Faculties.

¹ The number of hearings pending from previous years column includes hearings requested during the 2016-2017 academic year for courses taken during previous academic years.

Out of the 264 charges upheld by the Faculties, the Office of Student Tribunals received a total of 18 requests for AHP, including 9 requests due to repeat offences. Adding the above to the 21 AHP requests carried over from previous years, there were a total of 39 **AHP requests to process this past year**, including 21 for repeat offences.

Our office conducted hearings with respect to **17 cases** under the Code in the 2016-2017 academic year, as follows:

- **16 AHPs** (including 10 for repeat offence cases); and
- 1 Appeals Authorization Panel

As of July 1, 2017, we begin the 2017-2018 academic year with 18 cases awaiting hearings under the Code, 11 of which are for repeat offences.

The hearings carried over from 2016-2017 are due to:

- 17 separate requests to postpone hearings; and
- An increase in the number of hearing requests toward the end of the 2016-2017 academic year, including 13 hearing requests received by the Office of Student Tribunals after April 1, 2017.

Submitted by Laura Landry
Student Tribunals Officer
tribunal@alcor.concordia.ca
September 27, 2017

Encl.

Schedule A

Breakdown from July 11, 2016 to July 1, 2017 of the type of charges laid under the Academic Code of Conduct (the "Code")

Incident Reports filed under the Code

	Article 18	Article 19a	Article 19b	Article 19c	Article 19d	Article 19f	Article 19g	Article 19h	Article 19j	Article 19k
Arts and Science	161	65	2	27	12	–	32	–	–	1
Engineering and Computer Science	46	4	–	9	4	–	30	–	–	1
Fine Arts	–	9	–	1	3	–	2	–	–	–
John Molson School of Business	3	23	–	12	4	9	25	17	7	–
School of Graduate Studies	27	26	–	–	–	–	–	–	–	–
TOTAL	237	127	2	49	23	9	89	17	7	2

Note: See Excerpts from the Code on the following page for details about the contents of the articles listed above.
People may have been charged under more than one article with respect to the same incident.

Excerpts setting forth the types of charges from the Academic Code of Conduct

Article 18: "Any form of cheating, or plagiarism, as well as any other form of dishonest behaviour, intentional or not, related to the obtention of gain, academic or otherwise, or the interference in evaluative exercises committed by a student is an offence under this Code. Any attempt at or participation related in any way to an offence by a student is also an offence"

Article 19: "Without limiting, or restricting, the generality of Article 18 above and with the understanding that Articles 19 a) to l) are to be considered examples only, academic offences include, the carrying out, or attempting to carry out or participating in":

19a "plagiarism - the presentation of the work of another person, in whatever form, as one's own or without proper acknowledgement"

19b: "the contribution by one student to another student of work with the knowledge that the latter may submit the work in part or in whole as his or her own"

19c: "unauthorized collaboration between students"

19d: "tearing or mutilating an examination booklet or an examination paper, including, but not limited to, inserting pages into a booklet or taking a booklet or a portion of the booklet or examination paper from the examination room"

19f: "the obtention by theft or any other means or use of the questions and/or answers of an examination or of any other resource that one is not authorized to possess"

19g: "the possession or use during an examination of any non-authorized documents or materials or resource or possessing a device allowing access to or use of any non-authorized documents or materials"

19h: "the use of another person's examination during an examination"

19j: "impersonation - assuming the identity of another person or having another person assume one's own identity"

19k: "the falsification of a document, in particular a document transmitted to the University or a document of the University, whether transmitted or not to a third party, whatever the circumstances"