McGill UNIVERSITY SENATE

Report of the

Academic Policy Committee D23-58

525th REPORT OF THE ACADEMIC POLICY COMMITTEE TO SENATE
on the APC meeting held on March 28th, 2024.

I.   TO BE APPROVED BY SENATE

(A) NEW TEACHING PROGRAMS REQUIRING SENATE APPROVAL – *none*

(B) ACADEMIC PERFORMANCE ISSUES / POLICIES / GOVERNANCE/AWARDS

Office of the Provost and Executive Vice-President (Academic)
Second approval of the Online/Blended Courses and Programs: Definitions and Approvals – *appendix A*

At its meeting on March 28th, 2024, APC reviewed and approved the proposed terminology relating to online/blended learning, program types, approval pathways and the proposed definition of experiential learning. The terminology was previously reviewed at the March 16th, 2023, APC meeting, and approved via electronic vote by APC on March 20th, 2023. Furthermore, the terminology had undergone an initial review and approval by Senate on April 19th, 2023, with an understanding that such approval is subject to review by Senate in one year (April 2024). The proposed definitions and approvals were the culmination of a collaborative effort, stemming from the groundwork laid by the [Ad Hoc Advisory Committee on COVID Academic Planning and Policies](). They were comprehensively incorporated into the [New Models of Academic Program Delivery]()report. The impetus behind these definitions was the university's imperative need for standardized terminology amid the challenges posed by the COVID-19 pandemic, which necessitated the provision of remote offerings. The variances in how academic units interpreted certain terms underscored the paramount importance of establishing standardized definitions.

Be it resolved that Senate, on the recommendation of the Academic Policy Committee, approve the proposed terminology relating to online/blended learning, the proposed definition of program types, and the definition of experiential learning.

(C) CREATION OF NEW UNITS / NAME CHANGES / REPORTING CHANGES – *none*

(D) CHANGES IN DEGREE DESIGNATION – *none*

(E) INTER-UNIVERSITY PARTNERSHIPS – *none*

(F) OTHER

II.   TO BE ENDORSED BY SENATE / PRESENTED TO SENATE FOR DISCUSSION

III.   APPROVED BY APC IN THE NAME OF SENATE

(A) DEFINITIONS – *none*

(B) STUDENT EXCHANGE PARTNERSHIPS / CONTRACTS / INTERUNIVERSITY PARTNERSHIPS – *none*

(C) OTHER – *none*

IV.   FOR THE INFORMATION OF SENATE

I.   ACADEMIC REVIEWS – *none*

II.   APPROVAL OF COURSES AND TEACHING PROGRAMS – *none*

1.   Programs

a)   APC Approvals (new options/concentrations and major revisions to existing programs)

   i.   New Programs
   Approved by SCTP on January 11th, 2024, and approved by APC on March 28th, 2024.

   Graduate and Postdoctoral Studies
   Faculty of Engineering
   M.Eng. in Electrical Engineering; Non-Thesis – Applied Artificial Intelligence (45 cr.) – *appendix B*

   At its meeting on March 28th, APC reviewed and approved a proposal to create a new M.Eng. in Electrical Engineering; Non-Thesis – Applied Artificial Intelligence concentration in the Department of Electrical and Computer Engineering (ECE). This concentration was previously approved at the December 7th Subcommittee on Courses and Teaching Programs (SCTP) meeting. The concentration is intended to provide advanced education and training in applied Artificial Intelligence (AI) through specialized courses, focusing on fundamental knowledge, practical experience, and skills development. With the rapid rise of AI reshaping industries, the program meets the increased demand for educated AI specialists. It builds upon existing ECE courses, offering tailored technical electives to prepare students for careers in AI.

   ii.   Major Revisions of Existing Programs
   Approved by SCTP on February 1st, 2024, and approved by APC on March 28th, 2024.

   Graduate and Postdoctoral Studies
   Faculty of Arts
   Ph.D. in Russian and Slavic Studies (0 cr.)
   M.A. in Russian and Slavic Studies (45 cr.)

b)   APC Subcommittee on Courses and Teaching Programs (SCTP) Approvals
   (Summary Reports: http://www.mcgill.ca/sctp/documents/)

   i.   Moderate and Minor Program Revisions

   Approved by SCTP on January 11th, 2024; reported to APC on March 28th, 2024.

   Faculty of Arts
   B.A.; Honours in History (54 cr.)
   B.A.; Joint Honours – History Component (36 cr.)
   B.A.; Major Concentration in History (36 cr.)
   B.A.; Minor Concentration in History (18 cr.)
   B.A.; Joint Honours – International Development Studies Component (36 cr.)
   B.A.; Honours in International Development Studies (57 cr.)
   B.A.; Major Concentration in International Development Studies (36 cr.)

B.A.; Minor Concentration in International Development Studies (18 cr.)
B.A. Honours in Hispanic Studies (60 cr.)
B.A.; Joint Honours - Hispanic Studies Component (36 cr.)
B.A.; Major Concentration in Hispanic Studies (36 cr.)
B.S.W. (Three-Year Program) (90 cr.)

School of Continuing Studies
Certificate in Proficiency in English for Professional Communication (30 cr.)

Graduate and Postdoctoral Studies
<u>Faculty of Arts</u>
M.S.W.; Non-Thesis (45 cr.)
M.S.W.; Non-Thesis – Gender and Women's Studies (45 cr.)
M.A. in Linguistics; Non-Thesis (45 cr.)
M.P.P.; Non-Thesis (45 cr.)
M.S.W.; Gender and Women's Studies (45 cr.)

<u>Faculty of Dental Medicine and Oral Health Sciences</u>
Ph.D. in Oral Health Sciences (0 credit)
M.Sc. in Dental Sciences (45 cr.)

<u>Faculty of Engineering</u>
M.Eng. in Electrical Engineering; Non-Thesis (45 cr.)

<u>Interfaculty Studies</u>
M.Eng. in Biological and Biomedical Engineering; Non-Thesis - Biomanufacturing (45 cr.)
M.Eng. in Biological and Biomedical Engineering; Non-Thesis (45 cr.)

<u>Desautels Faculty of Management</u>
Graduate Certificate in Professional Accounting (30 cr.)

<u>Faculty of Medicine and Health Sciences</u>
Ph.D. in Nursing (0 cr.)

<u>Faculty of Science</u>
M.A. in Mathematics and Statistics (45 cr.)
M.A. in Mathematics and Statistics; Non-Thesis (45 cr.)
M.Sc. in Mathematics and Statistics (45 cr.)
M.Sc. in Mathematics and Statistics; Non-Thesis (45 cr.)

Desautels Faculty of Management
B.Com; Concentration in Entrepreneurship (15 cr.)
B.Com; Concentration Managing for Sustainability (15 cr.)
B.Com; Major Managing for Sustainability (72 cr.)

Faculty of Science
B.Sc.; Honours in Anatomy and Cell Biology (73 cr.)
B.Sc.; Major in Anatomy and Cell Biology (67 cr.)
B.Sc.; Liberal Program - Core Science Component in Anatomy and Cell Biology (47-48 cr.)
B.Sc.; Honours in Chemistry (71 cr.)
B.Sc.; Honours in Chemistry; Bio-organic (75 cr.)
B.Sc.; Honours in Chemistry; Biophysical Chemistry (74-75 cr.)
B.Sc.; Major in Chemistry (59 cr.)
B.Sc.; Major in Chemistry; Bio-organic (63 cr.)
B.Sc.; Major in Chemistry; Biophysical Chemistry (65-66 cr.)

B.Sc.; Liberal Program - Core Science Component in Chemistry; General (49 cr.)
B.Sc.; Honours in Geology (75 cr.)

Approved by SCTP on February 1st, 2024; reported to APC on March 28th, 2024.

Faculty of Arts
B.A.; Concentration majeure en Langue et littérature françaises; Études et pratiques littéraires (36 cr.)
B.A.; Concentration mineure en Langue et littérature françaises; Langue française (18 cr.)
B.A.; Concentration mineure en Langue et littérature françaises; Études et pratiques littéraires (18 cr.)
B.A.; Minor Concentration Linguistics (18 cr.)
B.A.; Minor Concentration in Social Entrepreneurship (18 cr.)
B.A.; Joint Honours - Political Science Component (36 cr.)
B.A. & Sc.; Joint Honours - Political Science Component (36 cr.)
B.A.; Minor Concentration in Political Science (18 cr.)
B.A. & Sc.; Minor Concentration in Political Science (18 cr.)
B.A.; Major Concentration in Political Science (36 cr.)
B.A. & Sc.; Major Concentration in Political Science (36 cr.)

School of Continuing Studies
Graduate Certificate in Data Analysis for Complex Systems (15 cr.)
Graduate Certificate in Data-Driven Decision Making (15 cr.)
Certificate in STEM Foundations (Science, Technology, Engineering & Math) (30 cr.)
Bachelor of Education for Certified Teachers; Elementary Education - Indigenous Education (90 cr.)
Certificate in First Nations and Inuit Educational Leadership (30 cr.)
Certificate in First Nations and Inuit Student Personnel Services (30 cr.)
Certificate in Education for First Nations and Inuit (60 cr.)
Certificate in Inclusive Education (30 cr.)
Certificate in Indigenous Language and Literacy Education (30 cr.)
Certificate in Middle School Education in Indigenous Communities (30 cr.)
Diploma in Human Relationships, Diversity and Sexuality (30 cr.)
Graduate Certificate in Counselling Applied to Teaching (15 cr.)
Graduate Certificate in Teaching Indigenous Education for Non Indigenous Educators (15 cr.)

Graduate and Postdoctoral Studies
Desautel Faculty of Management and Faculty of Law
Joint B.C.L./J.D. and M.B.A.; Non-Thesis - General Management (132 cr.)

Faculty of Medicine and Health Sciences
M.Sc. in Experimental Medicine; Bioethics (45 cr.)

Schulich School of Music
D.Mus.; Performance Studies (0 cr.)

ii. Program Retirements
Approved by SCTP on January 11th, 2024, and reported to APC on March 28th, 2024

School of Continuing Studies
Professional Development Certificate in Cloud Computing (42 CEUs)
Professional Development Certificate in Full Stack JavaScript Development (90 CEUs)

Graduate and Postdoctoral Studies
Faculty of Agriculture and Environmental Studies

M.Sc. in Entomology; Neotropical Environment (45 cr.)
Ph.D. in Entomology; Environment (0 cr.)
Ph.D. in Entomology; Neotropical Environment (0 cr.)
Ph.D. in Microbiology: Bioinformatics (0 cr.)
Ph.D. in Renewable Resources; Environment (0 cr.)

Approved by SCTP on February 1ˢᵗ, 2024, and reported to APC on March 28ᵗʰ, 2024

School of Continuing Studies
Certificate in Teaching English to Speakers of Other Languages (TESOL) (12 CEUs)
Graduate Certificate in Internet Business (15 cr.)

Graduate and Postdoctoral Studies
Faculty of Arts
Ph.D. in Russian (0 cr.)
M.A. in Russian (45 cr.)

2. **Courses**

   a) **New Courses**

   Reported as having been approved by SCTP on May 11ᵗʰ, 2023: 43
   Faculty of Arts: 1
   School of Continuing Studies:19
   Faculty of Medicine and Oral Health Sciences: 1
   Faculty of Education: 4
   Faculty of Engineering: 2
   Faculty of Law: 1
   Desautels Faculty of Management: 1
   Faculty of Medicine and Health Sciences: 7
   Faculty of Science: 7

   Reported as having been approved by SCTP on September 14ᵗʰ, 2023: 9
   Faculty of Agricultural and Environmental Sciences: 1
   School of Continuing Studies:1
   Faculty of Engineering: 2
   Desautels Faculty of Management: 1
   Schulich School of Music: 4

   Reported as having been approved by SCTP on October 12ᵗʰ, 2023: 11
   Faculty of Agricultural and Environmental Sciences: 1
   School of Continuing Studies:3
   Desautels Faculty of Management: 1
   Faculty of Medicine and Health Sciences: 6

   Reported as having been approved by SCTP on November 9ᵗʰ, 2023: 14
   Faculty of Arts: 3
   School of Continuing Studies: 2
   Faculty of Engineering: 2
   Desautels Faculty of Management: 4
   Faculty of Science: 3

   Reported as having been approved by SCTP on December 7ᵗʰ, 2023: 15
   Faculty of Agricultural and Environmental Sciences: 1
   Faculty of Arts: 4

School of Continuing Studies: 2
Faculty of Medicine and Health Sciences: 3
Schulich School of Music: 2
Faculty of Science: 3

Reported as having been approved by SCTP on January 11th, 2024: 33
Faculty of Arts: 11
School of Continuing Studies: 10
Faculty of Engineering: 1
Desautels Faculty of Management: 3
Faculty of Medicine and Health Sciences: 3
Schulich School of Music: 1
Faculty of Science: 4

Reported as having been approved by SCTP on February 1st, 2024:9
Faculty of Arts: 9

b) **Course Revisions**
Reported as having been approved by SCTP on May 11th, 2023: 77
Faculty of Agricultural and Environmental Sciences: *2*
Faculty of Arts: 6
School of Continuing Studies: 49
Faculty of Education: 6
Faculty of Engineering: 3
Faculty of Law: 1
Faculty of Medicine and Health Sciences: 6
Faculty of Science: 4

Reported as having been approved by SCTP on September 14th, 2023: 6
Faculty of Agricultural and Environmental Sciences: 1
School of Continuing Studies: 2
Faculty of Engineering: 1
Schulich School of Music: 2

Reported as having been approved by SCTP on October 12th, 2023: 15
Faculty of Agricultural and Environmental Sciences: *5*
Faculty of Arts: 2
School of Continuing Studies: 7
Desautels Faculty of Management: 1

Reported as having been approved by SCTP on November 9th, 2023: 26
Faculty of Arts: 1
Faculty of Engineering: 1
Desautels Faculty of Management: 10
Faculty of Medicine and Health Sciences: 2
Schulich School of Music: 4
Faculty of Science: 8

Reported as having been approved by SCTP on December 7th, 2023: 47
Faculty of Agricultural and Environmental Sciences: 5
Faculty of Arts: 7
Faculty of Engineering: 5
Faculty of Law: 5
Desautels Faculty of Management: 15
Schulich School of Music: 3

Faculty of Science: 7

Reported as having been approved by SCTP on January 11th, 2024: 46
Faculty of Arts: 7
Faculty of Dental Medicine and Oral Health Sciences: 1
Faculty of Engineering: 1
Desautels Faculty of Management: 18
Faculty of Science: 19

Reported as having been approved by SCTP on February 1st, 2024: 124
Faculty of Arts: 74
School of Continuing Studies: 50

c) **Course Retirements**
Reported as having been approved by SCTP on May 11th, 2023: 44
Faculty of Arts: 2
School of Continuing Studies: 36
Faculty of Education: 2
Faculty of Engineering: 4

Reported as having been approved by SCTP on September 14th, 2023: 2
School of Continuing Studies: 2

Reported as having been approved by SCTP on October 12th, 2023: 9
Faculty of Agricultural and Environmental Sciences: 7
Faculty of Arts: 2

Reported as having been approved by SCTP on November 9th, 2023: 2
Faculty of Medicine and Health Sciences: 2

Reported as having been approved by SCTP on December 7th, 2023: 16
Faculty of Arts: 5
Faculty of Engineering: 4
Schulich School of Music: 7

Reported as having been approved by SCTP on January 11th, 2024: 2
Faculty of Arts: 2

Reported as having been approved by SCTP on February 1st, 2024: 13
Faculty of Arts: 13

III. **OTHER –** *none*

MEMORANDUM

OFFICE OF THE PROVOST AND EXECUTIVE VICE-PRESIDENT (ACADEMIC)
James Administration Building
845 Sherbrooke Suite West, Suite 504
Tel: (514) 398-4177

DATE: March 18th, 2024

TO: Professor Christopher Manfredi, Provost and Executive Vice-President (Academic), Chair of APC

cc: Katharine Tiitson, Secretary of APC

FROM: Professor Christopher Buddle, Associate Provost (Teaching and Academic Planning), Vice Chair of APC

RE: Second approval of the *Online/Blended Courses and Programs: Definitions and Approvals* terminology

FOR: information   discussion   (decision)

Purpose:

The *Online/Blended Courses and Programs: Definitions and Approvals* report was initially approved and reviewed by Senate in April 2023 on the understanding that such approval is subject to review by Senate in one year (April 2024). Consultation and approval with APC is now requested regarding the review of these definitions, terminology, and approval pathways.

Background:

On April 19th, 2023, McGill University's Senate approved a report from the Academic Policy Committee related to terminology of blended online learning, program types, and approval pathways. These emerged in part because of experiences with teaching and learning in the pandemic, and directly from the work of the New Models of Academic Program Delivery Workgroup. There was a recognition that the University required clear terminology and approval pathways when we consider integration of online teaching and learning into our academic programs.

From the minutes of Senate from April 19th, 2023, the following is recorded:

On a motion duly proposed and seconded, Senate approved, on the recommendation of the Academic Policy Committee, the proposed terminology relating to online/blending learning, the proposed definitions of program types, and the definition of experiential learning.

Senate also approved the proposed approval and notification pathways relating to blended/hybrid courses, on the understanding that such approval and notification pathways are subject to review by Senate in one year (April 2024).

The definitions and approval pathways (see Appendix) were communicated to Faculties, and published online including, for example, on the [Teaching and Learning Knowledge Base](#).

The discussion in Senate in April 2023 was generally focused on process and governance rather than content. Some Senators felt that approvals of these were premature because the final report form the New Models of Academic Program Delivery had not yet been presented to Senate for information. That final report was, in the end, approved by the Provost in the summer of 2023, and that report was presented to Senate for information on October 18th, 2023.

The Associate Provost (Teaching and Academic Planning) has received limited additional feedback on the approved definitions and approval pathways. Over the course of the past academic year, the Subcommittee on Courses and Teaching Programs (SCTP) has received several notifications of changes in modality in courses, but otherwise has received limited feedback.

This document is therefore presented to the Academic Policy Committee in light of the requirement by Senate to return these definitions, terminology, and approval pathways, to Senate one year after adoption.

Prior consultations/approvals:

- March 9th, 2023, and March 13th, 2023: SCTP discussion and electronic approval
- March 16th, 2023: Academic Policy Committee
- April 19th, 2023: Senate

Next steps:

Presentation to Senate for review and approval.

Attachments

Appendix A: Online/Blended learning in courses: Terminology and Approvals/Notifications

Online/Blended learning in courses: Terminology and Approvals/Notifications

The following definitions are proposed for Approval at the University, via the Academic Policy Committee's Subcommittee on Courses and Teaching Programs (SCTP).

- **Asynchronous**: teaching and learning materials/activities prepared in advance that students can access at a time of their choosing, which in some cases, may be within a designated time frame.
- **Blended learning** (or blended course): teaching and learning activities made up of a combination of online and in-person course activities, both of which are necessary for students to achieve the learning outcomes of the course; it results in a reduction in the number of in-person hours scheduled for a course.
- **Distance learning** (or distance education): refers to students learning at a distance from their instructor, which assumes students are physically located off campus. This is often used interchangeably with online learning but may also apply to other situations.
- **Hybrid learning** (or hyflex): teaching activities in which some students are physically present and others attend online at the same time, with all students having the same learning opportunities to participate and engage with the learning activities.
- **In-person learning** (or in-person course): the default modality of course delivery, in which students are expected to physically attend the course activities in person to achieve the learning outcomes.
- **Online learning** (or online course): teaching and learning activities that have been designed so that all learning outcomes can be achieved using online tools; therefore a student's physical presence on campus is not necessary to achieve the learning outcomes
- **Remote delivery** (or remote instruction): a situational need to deliver a course online that would normally be delivered in person (as was the case during the COVID-19 pandemic), sometimes requiring the implementation of additional technologies on an *ad-hoc* basis.
- **Synchronous**: refers to scheduled teaching activities that involve active or live teaching and learning, whether online or in person.

<u>Approval and Notifications, Blended/Hybrid courses</u>

The following approval and notification pathways are proposed for Approval at the University, via the Academic Policy Committee's Subcommittee on Courses and Teaching Programs (SCTP).

- Blended learning where more than 15% but less that 50% of scheduled activities are online is to be implemented only with Faculty approval.
- It is recommended that each Faculties establish their own guidelines and approval process for developing blended learning in courses and such approvals be considered an implemented at a Programmatic or Unit/Faculty level.
- It is recommended that the Academic Policy Committee's Subcommittee on Courses and Teaching Programs (SCTP) be notified when (1) any course whose modality of delivery is modified to be blended in this way; or (2) a course is to be modified to be hybrid.

Notes:

- If necessary, Faculties may establish stricter guidelines than what is presented due to accreditation or for reasons related to learning outcomes or competencies that are not possible to complete online.
- Barring stricter guidelines, anything below the 15% threshold is therefore at the discretion of the instructor. For a standard three-credit Lecture based course at McGill, this means about six scheduled hours (i.e., two weeks in a course with three lecture hours per week) could be done online.
- If more than 50% of a course is designed online, or if a course is to be developed as hybrid, this is considered a complete re-design of a course, with relevant approvals and oversight at the program or Unit/Faculty level, followed by notification to SCTP.

<u>Definitions of Program Types</u>

The following definitions are hereby proposed for Approval at the University, via the Academic Policy Committee's Subcommittee on Courses and Teaching Programs (SCTP).

<u>For-Credit Programs</u>

Blended program: An academic program that offers a combination of University-approved online or in-person, or blended courses necessary for students to achieve the learning outcomes of the program.

Modular degree: A non-thesis (i.e., course-based or project-based) graduate degree consisting of at least 45 credits, generally completed over a one-year period and divided into three modules: a first module designed to deepen disciplinary knowledge; a second module designed to complement the student's disciplinary knowledge through a set of University courses to broaden their skill set in complementary areas—for instance, a coherent package of courses from another discipline; and a third module that emphasizes experiential learning or similar opportunities to apply acquired knowledge and skills.

Online program: An academic program that has been expressly designed for online delivery through the intentional implementation of instructional activities and selected technologies that support the achievement of program learning outcomes. In this program, all University-approved courses and course activities are completed online.

Program (or **Academic program**): A University-approved, structured selection of official courses within an area of study or a discipline.

Short program: A unit of achievement smaller than a degree that is credited, credentialled, and transcripted, such as a graduate certificate. A short program may also be condensed or delivered over a short period of time.

Stackable degree: A degree formed by "stacking" (i.e., combining) short-program credentials that are in themselves recognized as units of achievement (e.g., certificates). A stackable degree is flexible in terms of completion time, and the student is granted a credential for each recognized unit of achievement before obtaining the full stackable degree.

<u>Non-Credit Activities</u>

Micro-credential: A short unit of validated learning focused on the acquisition of industry- relevant competencies. The successful completion of a micro-credential is generally recognized and recorded through alternative digital credentials (ADCs), often called "digital badges."

Workshop: An activity that focuses on the acquisition of specific competencies that are often technical in nature. Workshops are not subject to central approval, do not carry university credit or Continuing Education Units, and do not appear on official university transcripts.

<u>Other Definitions</u>

Experiential Learning: The general application of academic content to applied situations, be it within the classroom, the community, or the workplace, followed by deliberate reflection on this application. Experiential learning advances and complements program- or course-based learning outcomes and sometimes focuses on employability skills.

Approved by SCTP: March 13, 2023

McGill
New Program/Concentration Proposal Form

(2019)

1.0 Degree Title
Please specify the two degrees for concurrent degree programs

> M.Eng.

2.0 Administering Faculty or GPS

> Graduate and Postdoctoral Studies

1.1 Major (Subject/Discipline) (30-char. max.)

> Electrical Engineering

Offering Faculty & Department

> Faculty of Engineering / Department of Electrical and Computer Engineering

1.2 Concentration (Option) (30 char. max.)

> Applied Artificial Intelligence

3.0 Effective Term of Implementation
(Ex. Sept. 2019 or 201909)
Term

> 202409

1.3 Complete Program Title (info from boxes 1.0+1.1+1.2+5.2)

> M.Eng.; Electrical Engineering (Non-Thesis) Applied Artificial Intelligence Concentration

4.0 Rationale and Admission Requirements for New Program/Concentration

> See attached

5.0 Program Information
Indicate an "x" as appropriate

5.1 Program Type
Bachelor's Program
X Master's
M.Sc.(Applied) Program
Dual Degree/Concurrent Program
Certificate
Diploma
Graduate Certificate
Graduate Diploma
Professional Development Cert
Ph.D. Program
Doctorate Program
(Other than Ph.D.)
Self-Funded/Private Program
Off-Campus Program
Distance Education Program
Other (Please specify)

5.2 Category
Faculty Program (FP)
Major
Joint Major
Major Concentration (CON)
Minor
Minor Concentration (CON)
Honours (HON)
Joint Honours Component (HC)
Internship/Co-op
Thesis (T)
X Non-Thesis (N)
Other
Please specify

5.3 Level
Undergraduate
Dentistry/Law/Medicine
Continuing Studies (Non-Credit)
Collegial
X Masters & Grad Dips & Certs
Doctorate
Post-Graduate Medicine/Dentistry
Graduate Qualifying

5.4 Requires Centrally-Funded Resources
Yes __X__ No ____

6.0 Total Credits

> 45

7.0 Consultation with
Related Units	X Yes	No
Financial Consult	X Yes	No

Attach list of consultations.

8.0 Program Description (Maximum 150 words)

The Master of Engineering in Electrical Engineering; Non-Thesis - Applied Artificial Intelligence is a professional program of 45 credits. The program provides the foundation for applications of Artificial Intelligence (AI) techniques and experience building an AI system in various fields of interest. The program may be completed on a part-time basis.

9.0 List of proposed new Program/Concentration

If new concentration (option) of existing program, a program layout (list of all courses) of existing program **must** be attached.

Proposed program (list courses as follows: Subj Code/Crse Num, Title, Credit Weight under the headings of: Required Courses, Complementary Courses, Elective Courses)

M.Eng. in Electrical Engineering; Non-Thesis - Applied Artificial Intelligence (45 credits)

Required Courses (14 credits)
ECSE 551 Machine Learning for Engineers (4 cr.)
ECSE 552 Deep Learning (4 cr.)
ECSE 679D1/D2 Project in Applied Artificial Intelligence (6 cr.)

Complementary Courses (18-24 credits)
Group A: Artificial Intelligence Focused
6-8 credits from the following:
ECSE 526 Artificial Intelligence (3 cr.)
ECSE 555 Advanced Topics in Artificial Intelligence (4 cr.)
ECSE 556 Machine Learning in Network Biology (4 cr.)
ECSE 557 Introduction to Ethics of Intelligent Systems (3 cr.)
ECSE 626 Statistical Computer Vision (4 cr.)
ECSE 683 Topics in Vision and Robotics (4 cr.)

Group B: Mathematical Foundations of Artificial Intelligence
3-4 credits from the following:
COMP 540 Matrix Computations (4 cr.)
ECSE 500 Mathematical Foundations of Systems (3 cr.)
ECSE 501 Linear Systems (3 cr.)
ECSE 507 Optimization and Optimal Control (3 cr.)
ECSE 509 Probability and Random Signals 2 (3 cr.)
ECSE 543 Numerical Methods in Electrical Engineering (3 cr.)
ECSE 621 Statistical Detection and Estimation (4 cr.)

Group C: Applications of Artificial Intelligence
9-12 credits from the following:
COMP 545 Natural Language Understanding with Deep Learning (4 cr.)
COMP 549 Brain Inspired Artificial Intelligence (3 cr.)
COMP 558 Fundamentals of Computer Vision (4 cr.)
COMP 565 Machine Learning in Genomics and Healthcare (4 cr.)
COMP 579 Reinforcement Learning (4 cr.)
COMP 585 Intelligent Software Systems (4 cr.)
COMP 588 Probabilistic Graphical Models (4 cr.)
COMP 685 Machine Learning Applied to Climate Change (4 cr.)

[CONTINUED ON NEXT PAGE]

Attach extra page(s) as needed

ECSE 506 Stochastic Control and Decision Theory (3 cr.)
ECSE 508 Multiagent Systems (3 cr.)
ECSE 541 Design of Multiprocessor Systems-on-Chip (3 cr.)
ECSE 544 Computational Photography (4 cr.)
ECSE 546 Advanced Image Synthesis (4 cr.)
ECSE 554 Applied Robotics (4 cr.)
MECH 559 Engineering Systems Optimization (3 cr.)

Elective Courses (7-13 credits)
7-13 credits at the 500 or 600 level (excluding ECSE 691 to ECSE 697).

* No more than 16 credits in total may be outside the Department. With the exception of courses in the Complementary Courses list, non-departmental courses require Departmental Approval. In exceptional circumstances and with proper justification, students may be permitted to take more than 16 credits of non-Departmental courses; approval from the Graduate Program Director or delegate is required.

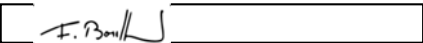**EXISTING PROGRAM'S REQUIREMENTS**

M.Eng. in Electrical Engineering; Non-Thesis (45 credits)

Complementary Courses (45 credits)
Full-time students must complete the program in three years.

45 credits of 500- or 600- courses, of which no more than 16 credits may be outside the Department.
Students may not take Thesis Research courses - ECSE 691 to ECSE 697.

* Non-departmental courses require Departmental Approval. In exceptional circumstances and with proper justification, students may be permitted to take more than 16 credits of non-Departmental courses; approval from the Graduate Program Director or delegate is required.

10.0 Approvals

Routing Sequence	Name	Signature	Meeting Date
Department	Francois Bouffard	F. Bouff	October 17, 2023
Curric/Acad Committee	Roni Khazaka	Roni Khazaka	Oct 25, 2023
Faculty 1	Roni Khazaka	Roni Khazaka	Nov 7, 2023
Faculty 2			
Faculty 3			
CGPS		CGPS Meeting	Nov. 13, 2023
SCTP	Cindy Smith, SCTP		December 7, 2023
APC			
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Department	Francois Bouffard	*F. Bouff*	October 17, 2023
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RATIONALE for ECE Artificial Intelligence Concentration

As noted in the new concentration proposal form, we propose the addition of an Applied Artificial Intelligence (AI) concentration to the existing non-thesis course-based master's program in the Department of Electrical and Computer Engineering (ECE).

The new Applied AI concentration aims to provide students with advanced education and training in applied AI, through specialized graduate-level courses that will enhance previous education and work training/experience. Specifically, the training objectives of the program are:

1. To provide the fundamental knowledge required to understand, develop, and apply complex AI algorithms and techniques;
2. To present the current state-of-the-art processing architecture and methods in AI;
3. To provide practical experience in building and evaluating an AI system.

The recent rapid rise of AI tools and systems has disrupted society and existing industries. AI is now currently reshaping the economical landscape. In the past few years, AI has moved out of academic and industrial research labs and has found its way into a multitude of industrial and commercial applications. As more industries and businesses realize the benefits of using AI in their operations, the need for educated AI specialists will also increase. To fully harness AI's potential, these specialists *must combine mastery of fundamental AI principles and techniques with application-specific knowledge*.

The Applied AI Concentration of the course-based M.Eng. is a professional degree, building on already existing courses in the ECE Master's curriculum which will provide the backbone of the new concentration. These courses instill the fundamental knowledge and develop the skills required for a successful career in AI. Through technical electives, the students will develop critical skills in the analysis, design and implementation of AI systems tailored to application areas that fit their interests and career goals. A non-exhaustive list of technical skills needed for an engineering career in AI and acquired or enhanced through the program include:

- Understanding of fundamental machine learning (ML) and deep leaning (DL) architectures and model training (convolutional networks, reinforcement learning, generative adversarial networks, etc.)
- Proficiency with ML framework such as TensorFlow, Pytorch, etc., as needed to build, train, and evaluate ML and DL models.
- Ability to apply data analysis, management, preprocessing and visualization techniques in the development and evaluation of AI systems.
- Strong mathematical foundation in AI related mathematics: including linear algebra, modern optimization, probability, and statistics.
- Problem-solving and critical-thinking skills to engineer and design AI solutions that address real-world problems in various application areas.

Besides, these technical skills, soft skills like communication and project management will be enhanced through the program.

The existing courses are complemented by a new required course, ECSE 679 Project in Applied AI, which is aimed at solidifying the fundamental knowledge acquired and applying it to conceive and develop solutions to selected AI problems and to conduct performance evaluations of AI systems.

The new program hopes to attract fifteen (15) new students each year. These students will have an existing degree in electrical engineering, computer engineering, or equivalent experience and knowledge in computer science or a related field. This program can be taken both on a full-time or part-time basis. This flexibility will attract both existing workers in the local AI industry as well as local, national, and international students that wish to attain the competencies required to enter the Applied AI field.

The admission requirements for the new program are consistent with those for existing programs in the department. Applicants should be graduates of institutions with recognized accreditation and hold degrees from such institutions. The applicant must present evidence of academic achievement: a minimum standing equivalent to a cumulative grade point average (CGPA) of 3.0 out of a possible 4.0 or a CGPA of 3.2 out of 4.0 for the last two years of full-time study. High grades are expected in courses considered by the academic unit to be preparatory to the graduate program. In particular, the ranking of the applicants and recommendations for acceptance will be first made by the graduate office staff based on a set of admission requirements and principles. These recommendations will then be reviewed and finalized by a committee consisting of selected Professors from the Department.

The ECE Department is well-positioned to offer the proposed Applied AI concentration. ECE already has strengths in multiple research areas and has very well-established groups such as Intelligent Systems, Communications and Signal Processing, Photonics, Digital Systems, Software Engineering, and Systems and Control, all of which do cutting-edge research in Applied AI. This new program, marketed specifically as specializing in Applied AI, will bring these departmental strengths to the forefront. The ECE groups are well-connected and have strong research collaborations with other Units at McGill such as the School of Computer Science, and with experts from Ecole Polytechnique of Montreal, UdeM, etc. Many of the professors in ECE are affiliated with research institutes such as Mila and IVADO and are also holders of CIFAR AI Chairs.

Finally, this proposed program fits well with the mandate of McGill's Strategic Research Plan, specifically with respect to the development of knowledge of the foundations, applications, and impacts of technology in the Digital Age.

Market Demand

Canada is a global leader in AI. Quebec, and more specifically Montreal, is a world-recognized AI hub that has attracted over $500 million in public funding and over $1.4 billion in venture capital financing (Investissement Quebec, 2019). Montreal is the home of regional and national offices of multiple organizations specializing in AI such as Google Brain, Microsoft (Maluuba), IBM AI lab, Facebook, and DeepMind. Montreal also is the home of AI research institutes/centres such as Mila and IVADO that already include researchers from McGill University. Almost 150,000 IT professionals work in the city and local companies are always hiring new employees for their growing operations (Investissement Quebec, 2022). Therefore, applied AI is a growing employment market in McGill's backyard. There is an increasing number of job opportunities for McGill graduates in this growing IT market segment. Similarly, many prospective students are looking for additional training that will allow them to enter this specialized AI/IT employment market.

Quebec must compete with other AI hubs by creating academic programs that will feed future graduates into these local AI companies and organizations. Other regions in Canada have

responded by building the infrastructure that links universities and future AI employers. For example, the Vector Institute for Artificial Intelligence is a non-profit corporation founded in March 2017 with the support of the Government of Canada, the Government of Ontario, industry, and Ontario universities and colleges. As part of CIFAR's Pan-Canadian AI Strategy, both the Vector Institute and Mila received $44 million in start-up funding in 2017. The Canadian government budget of 2021 announced an additional investment of $443.8 million in funding over 10 years for the Pan-Canadian Artificial Intelligence Strategy (Deloitte, 2022). In Ontario, the Vector Institute has worked with university partners on AI curriculum development. As of 2023, twenty-six (26) AI master's programs have been recognized by the Vector Institute as ones that provide graduates with the skills and competencies sought by employers hiring AI talent (Vector Institute, 2023). Of these twenty-six, five are specific to engineering and are competing programs to the proposed concentration. These five Ontario-based programs are:

- Queen's University: MASc in Electrical and Computer Engineering (Field of Study in AI)
- Toronto Metropolitan University (Course-based): MEng (AI Concentration)
- University of Guelph (Thesis-based); MSc/MASc (Collaborative Specialization in AI)
- University of Ottawa (Project-based): MEng/MASc in ECE (Applied AI Concentration)
- Western University (Project-based): MEng/MESc in Electrical and Computer Engineering (Collaborative Specialization in AI)

Table 1 provides additional information, such as program format and host departments, on competing programs located in Ontario and other provinces.

In response, McGill will introduce this Applied AI concentration to create AI specialists that are market-ready for careers in the local AI industry. The McGill Applied AI concentration program has the advantage in the Quebec market as it has a broader appeal and is thus more attractive to more prospective students than the highly specialized program offered by Polytechnique Montreal that may appeal only to video game designers or film professionals. The McGill program is open to all AI specialists and can cater to students' specific needs and interests for professional development by providing the basic and foundational knowledge required for the industry. There already exists a pent-up demand for the course-based ECE master's program as illustrated previously in the large number of applicants each year to ECE graduate programs. The addition of the Applied AI concentration to a growing AI-based economy will only further enhance the appeal of the program. This new program is a complement to the existing course-based non-thesis master's program and will welcome fifteen (15) new students each year that wish to specialize in applied AI within ECE.

Table 1: Similar programs in Canada to the proposed Applied AI concentration

University	Department	Degree	Format
McGill	Electrical and Computer Engineering	MEng, Artificial Intelligence Concentration	Coursework
Polytechnique Montreal	Computer Engineering	DESS or MEng, Option Artificial Intelligence in Interactive Digital Entertainment	Internship or Project
Waterloo	Electrical and Computer Engineering	MEng, Specialization in Artificial Intelligence and Machine Learning	Coursework
Carleton	Electrical and Computer Engineering	MEng, Specialization in Software Engineering	Coursework

Queen's	Electrical and Computer Engineering	Master of Applied Science (MASc) with a Field of Study in Artificial Intelligence	Thesis
Toronto Metropolitan	Electrical, Computer, and Biomedical Engineering	MEng, with AI Concentration	Coursework
Guelph	Multiple, College of Engineering and Physical Sciences	MASc, Collaborative Specialization in Artificial Intelligence	Thesis
Ottawa	School of Electrical and Computer Science	MEng/MASc, Concentration Applied Artificial Intelligence	Project
Western	Electrical and Computer Engineering	MEng/MESc, Collaborative Specialization in Artificial Intelligence	Project
Memorial	Computer Engineering - multidisciplinary	MAI – Master of Artificial Intelligence	Coursework

McGill will be in direct competition with similar course-based programs based at Waterloo, Carleton, Toronto Metropolitan, and Memorial universities, and with project-based programs at Ottawa and Western universities. However, the national and international demand for AI specialists and the growing employment in this field will prompt prospective students to register in graduate programs such as the one proposed here to gain the necessary expertise to enter the industry. Increased job prospects are driven by the expanding adoption of AI technologies within society and across industries, and the growing investments in AI research and development. Graduates of the Applied AI programs can be employed afterwards as data scientists, applications engineers, and control engineers in multiple industries outside of engineering such as IT and software development, the banking and financial sector, and healthcare.

Justification of courses in the Applied AI concentration

The program has been coherently organized into three main constituents, i.e.: required courses (14 credits), complementary courses (18-24 credits), and elective courses (7-13 credits), as further elaborated below.

Specifically, students in the Applied AI concentration will be required to take the following AI-specific courses for credit:

- ECSE 551: Machine Learning for Engineers (4)
- ECSE 552: Deep Learning (4)
- ECSE 679: Project in Applied AI (New course) (6)

The first two courses, to be taken early in the program, cover material that is judged essential to establish foundational knowledge and skills in AI. Specifically, ECSE 551 introduces the student to fundamental concepts of learning, regression and classification that are central to the development of cutting-edge AI systems, while ECSE 552 delves into modern deep learning architectures and key training methodologies and algorithms, all considered indispensable tools for the efficient implementation of AI systems. Finally, ECSE 679 is aimed at solidifying the fundamental knowledge acquired in ECSE 551, ECSE 552, and other courses from the Applied AI concentration, by applying this knowledge to conceive effective solutions to selected AI problems of current interest and to conduct performance evaluation of AI systems. One member

of the departmental Faculty will be responsible for administering the course and defining guidelines for its content and the projects, while other Faculty members may be chosen to provide specific project supervision. Since the admission is limited to a maximum of fifteen (15) students per academic year, obtaining the required faculty supervision is not seen to be an issue for the program moving forward.

The complementary courses have been logically organized into three groups, namely: Group A (6-8 credits), Group B (3-4 credits) and Group C (9-12 credits). The purpose of each group is to enhance the learning experience of the students along three different, yet interrelated avenues. Specifically, students will have to take at least two courses from Group A, which consists of a selection of AI-specific courses from the ECE Department:

- ECSE 526 Artificial Intelligence (3)
- ECSE 555 Advanced Topics in Artificial Intelligence (4)
- ECSE 556 Machine Learning in Network Biology (4)
- ECSE 557 Introduction to Ethics of Intelligent Systems (3)
- ECSE 626 Statistical Computer Vision (4)
- ECSE 683 Topics in Vision and Robotics (4)

Students will need to take one course from Group B, which consists of a combination of advanced mathematical courses from the ECE Department and the School of Computer Science (SCS). The concepts covered by these courses play central role in the analysis, development and evaluation of modern AI systems and technologies. Finally, students will have to take between three (3) to four (4) courses from Group C, which consists of a selection of courses from the ECE Department, SCS, and the Mechanical Engineering Department. These courses are all oriented towards practical applications of AI in various areas of electrical and mechanical engineering, and computer science. The rather large menu of courses will allow to student to fine tune the academic learning experience to their personal technical interest, career plan or future aspirations. A detailed list of the courses included in Groups B and C can be found in the program description form.

The combination of required and complementary AI courses will build and expand the foundations upon which students will enhance their skills in machine learning, intelligent user interfaces, programming, data engineering and analysis, modeling, and other relevant topics that are essential for success in the AI field. Finally, the student will be required to complete their program of study by selecting between seven to thirteen (7-13) credits of elective courses at the 500- or 600- level.

Program Management and Governance

Similar to other graduate programs in our Department (MSc and PhD), the new course-based MEng program and its associated Applied AI concentration will be managed by the staff of the Graduate Office in the ECE Department, under the responsibility of the Graduate Program Director (GPD), currently Prof. Benoit Champagne. Current staff positions in the ECE graduate office include: a Graduate Program Administrator (GPA) and two Student Affair Coordinators (SAC). The approved budget for the course-based MEng program will allow the creation of a new staff position, as needed to handle the additional load brought about by the program and its Applied AI concentration.

The office staff will carry out the main tasks and recurring duties needed to operate the program on a day-to-day basis, including processing of application files, preparing admission letters, maintenance of student records, issuing of special letters (e.g., for student visa application), etc. As for the new position, the incumbent is expected to fulfill further specific duties related to the new MEng program (and its Applied AI concentration): overseeing the admissions process, providing academic advising to the students in the program, and implementing the program regulations. Selected professors from the ECE Department may also be solicited to provide further assistance to students, e.g., to optimize their choice of courses through the various possible paths based on their interest and background. Finally, as indicated above, one of professors will be responsible for planning and administering the new required course ECSE 679 Project in Applied AI, a distinguishing component of the concentration.

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