New Program/Major or Minor/Concentration Proposal Form

(2013)

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

Graduate Certificate (Gr. Cert.)

1.1 Major (Legacy = Subject) (30-char. max.)

Translational Biomedical Engineering

1.2 Concentration (Legacy = Concentration/Option)
If applicable to Majors only (30 char. max)

1.3 Minor (with Concentration, if Applicable) (30char. max)

2.0 Administering Faculty/Unit

Graduate and Postdoctoral Studies (GPS)

Offering Faculty/Department

MED. / Biomedical Engineering

3.0 Effective Term of Implementation
(Ex. Sept. 2004 = 200409)
Term

2017-09

4.0 Rationale and Admission Requirements for New Proposal

McGill's current graduate program in Biological and Biomedical Engineering provides an excellent preparation for a research career but little training in the translational skills required to design, develop, manufacture, and commercialize biomedical devices and technologies. There is strong student interest in such training and a clear demand in industry for students with this expertise. This certificate represents an initiative to meet this need.

Entrance Requirements: See last page.

5.0 Program Information

Please check appropriate box(es)

5.1 Program Type

- ☐ Bachelor's Program
- ☐ Master's
- ☐ M.Sc. (Applied) Program
- ☐ Dual Degree/Concurrent Program
- ☐ Certificate
- ☐ Diploma
- ☒ Graduate Certificate
- ☐ Graduate Diploma
- ☐ Ph.D. Program
- ☐ Doctorate Program (Other than Ph.D.)
- ☐ Private Program
- ☐ Off-Campus Program
- ☐ Distance Education Program (By Correspondence)
- ☐ 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)
- ☐ Non-Thesis (N)
- ☐ Other:

Please specify

5.3 Level

- ☐ Undergraduate
- ☐ Dentistry/Law/Medicine
- ☐ Continuing Studies (Non-Credits)
- ☒ Masters & Grad Dip & Certs
- ☐ Doctorate
- ☐ Post-Graduate Medicine/ Dentistry
- ☐ Graduate Qualifying
- ☐ Postdoctoral Fellows

5.4 FQRSC (Research) Indicator
(For GPS)

☐ Yes ☒ No

6.0 Total Credits

15

7.0 Consultation with

Related Units ☒ Yes ☐ No

Financial Consult ☒ Yes ☐ No

Attach list of consultations.

8.0 Program Description (Maximum 150 words)

The program comprises three mandatory core courses and two electives. The mandatory courses deal with topics that are unique to the translational process in the biomedical engineering environment. Topics covered will include: managing intellectual property, patents and the patenting process, regulatory affairs, medical standards, quality management systems, and clinical trials. The two elective courses will provide the student with advanced training In a specialized area of biomedical engineering selected from the areas where Departmental staff have significant expertise.

In cases where students have taken one or more of the core courses as part of another program, these core courses will be replaced with the equivalent number of credits by other appropriate courses selected in consultation with the program director.

9.0 List of proposed program for the New Program/Major or Minor/Concentration

If new concentration (option) of existing Major/Minor (program), please attach a program layout (list of courses) of existing Major/Minor.

Proposed program (list course as follow: Subj Code/Crse Num, Title, Credit weight, under the heading of: Required Courses, Complementary Courses, and Elective Courses).

Graduate Certificate in Translational Biomedical Engineering (15 credits)

Required Courses (9 credits)
Three courses dealing with issues related specifically to the translation of biomedical engineering advances to clinical and commercial environment:

BMDE 653 Patents in Biomedical Engineering (3 credits)
BMDE 654 Biomedical Regulatory Affairs - Medical Devices (3 credits)
BMDE 655 Biomedical Regulatory Affairs - Medical Devices (3 credits)

Elective Courses (6 Credits)
Students must complete two courses dealing with advanced topics in a specialized area of biomedical engineering from one of the following domains:

General Biomedical Engineering
BMDE 501 Selected Topics in Biomedical Engineering (3 credits)

Biomedical Signals and Systems
BMDE 502 BME Modelling and Identification (3 credits)
BMDE 503 Biomedical Instrumentation (3 credits)
BMDE 512 Finite-Element Modelling in Biomedical Engineering (3 credits)
BMDE 519 Biomedical Signals and Systems (3 credits)

Medical Imaging
BIEN 530 Imaging and Bioanalytical Instrumentation (3 credits)
BMDE 610 Functional Neuroimaging Fusion (3 credits)
BMDE 650 Advanced Medical Imaging (3 credits)
MDPH 607 Introduction to Medical Imaging (3 credits)

Biomaterials and Tissue Engineering
BIEN 510 Nanoparticles in the Medical Sciences (3 credits)
BMDE 504 Biomaterials and Bioperformance (3 credits)
BMDE 505 Cell and Tissue Engineering (3 credits)

Biosensors and Devices
BIEN 520 High Throughput Bioanalytical Devices (3 credits)
BIEN 550 Biomolecular Devices (3 credits)
BIEN 560 Biosensors (3 credits)
BMDE 503 Biomedical Instrumentation (3 credits)
BMDE 508 Introduction to Micro and Nano-Bioengineering (3 credits)

10.0 Approvals

Routing Sequence	Name	Signature	Date
Department	Prof. Robert E. Kearney		Dec. 12/16
Curric/Acad Committee	Prof. Robert E. Kearney		Dec. 12/16
Faculty 1	DAVID RADSDALE		Dec 20, 2016
Faculty 2	Elaine Davis		Dec. 20, 2016
Faculty 3			
CGPS			
SCTP			
APC			
Senate			

Submitted by

Name	
Phone	
Email	
Submission Date	

To be completed by ARR:

CIP Code

Entrance requirements: Students with an undergraduate engineering degree with a major or minor in biomedical engineering, or the equivalent and an undergraduate GPA of 3.3. Graduates from other areas of engineering /natural sciences will be admitted provided that they have a background in general physiology equivalent to that covered in both Physiology 209 and 210. Applicants lacking the life science background may be admitted but will be required to fulfill the physiology prerequisite in the first year of the certificate. This may be achieved by taking Physiology 209 and 210 or other courses approved by the program director.

Change history:
V01 - original version
V02 - modify to remove credit for courses taken as part of other programs. All students must take 15 credits.

APPENDIX 1

CONSULTATION REPORT FORM
RE PROGRAM PROPOSALS

DATE: November 29, 2016

TO: Prof. Jan Seuntjens
Director, Medical Physics Unit

FROM: Professor Robert E. Kearney
Chair, Biomedical Eng. Dept.

The attached proposal has been submitted to the Curriculum Committee, and it has been decided that your department should be consulted.

Program Title: Certificate in Translational Biomedical Engineering

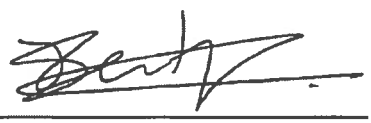
Would you be good enough to review this proposal and let me know as soon as possible, on this form, whether or not your department has any objections to, or comments regarding, the proposal. Specifically, a course taught by your department that has been included in the program's list of courses.

X **NO OBJECTIONS** _____ **SOME OBJECTIONS**

COMMENTS:

I reviewed the document and I see no issue from the perspective of medical physics, related to course MDPH 607 (Intro To Medical Imaging).

I think there would be interest from a subset of research oriented medical physics trainees to learn more about the courses related to IP registration, protection and commercialization and clinical testing (BMDE 653-655). Within our Medical Physics Research Training Network (MPRTN) CREATE network these are some of the elements that MPRTN trainees are confronted with, be it by ad-hoc workshops, etc rather than formal courses. Hence, I am looking forward how we possibly could collaborate and exchange on these initiatives.

Signature: 

Date: Dec 6, 2016

APPENDIX 1

CONSULTATION REPORT FORM
RE PROGRAM PROPOSALS

DATE: November 29, 2016

TO: Prof. John Orlowski
Chair, Physiology Dept.

FROM: Professor Robert E. Kearney
Chair, Biomedical Eng. Dept.

The attached proposal has been submitted to the Curriculum Committee, and it has been decided that your department should be consulted.

Program Title: Certificate in Translational Biomedical Engineering

Would you be good enough to review this proposal and let me know as soon as possible, on this form, whether or not your department has any objections to, or comments regarding, the proposal.

__X__ **NO OBJECTIONS** _____ **SOME OBJECTIONS**

COMMENTS:

Thoughtful and timely program.

Signature: J. Orlowski

Date: November 30, 2016

APPENDIX 1

CONSULTATION REPORT FORM
RE PROGRAM PROPOSALS

DATE: November 29, 2016

TO: Prof. Jake Barralet
Vice Chair (Research)
Dept. Surgery

FROM: Professor Robert E. Kearney
Chair, Biomedical Eng. Dept.

The attached proposal has been submitted to the Curriculum Committee, and it has been decided that your department should be consulted.

Program Title: Certificate in Translational Biomedical Engineering

Would you be good enough to review this proposal and let me know as soon as possible, on this form, whether or not your department has any objections to, or comments regarding, the proposal.

__X__ **NO OBJECTIONS SUBJECT TO THE COMMENTS BELOW**
_____ **SOME OBJECTIONS**

COMMENTS:
There is are no objections if our students can freely access these courses as per the agreement between Biomedical engineering and Surgery that:

- Students registered through the graduate programs in Experimental Surgery will be permitted to take the three courses in class listed below. Biomedical engineering will guarantee access to these courses for up to 15 students/year/course. Additional students will be accommodated provided space and resources are available:
  - BMDE-653 Patents in Biomedical Engineering (effective Winter 2017)
  - BMDE-654 Biomedical Regulatory Affairs (effective FALL 2017)
  - BMDE-655 Biomedical Clinical Trials (effective Winter 2018)
- These three courses will be made available on-line with the next 1-2 years. Once this is achieved there will be no limit to the number of Experimental Surgery's students Biomedical engineering could accommodate.
- Surgery will provide one time video capture of these courses FOC and provide Biomedical engineering with copies. We agree to have BMDE-653 , which starts in January 2017, video subject to
  - The instructor(s) agreement, which we will solicit;
  - Copyright of the videos being held by The Department of Biomedical ineering
- Distribution of the videos to students and others would be under the control of BME. Videoing of BMDE 654 and 655 may or may not be appropriate since we hope to have these two courses develop for in-line presentation from the start.

Signature: _____

Date: 9.12.16

APPENDIX 1

CONSULTATION REPORT FORM
RE PROGRAM PROPOSALS

DATE: November 29, 2016

TO: Prof. Dan Nicolau
Chair, Bioengineering Dept.

FROM: Professor Robert E. Kearney
Chair, Biomedical Eng. Dept.

The attached proposal has been submitted to the Curriculum Committee, and it has been decided that your department should be consulted.

Program Title: Certificate in Translational Biomedical Engineering

Would you be good enough to review this proposal and let me know as soon as possible, on this form, whether or not your department has any objections to, or comments regarding, the proposal. Specifically, courses taught by your department that have been included in the program's list of courses.

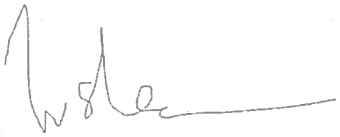
_____ **NO OBJECTIONS** __X__ **SOME OBJECTIONS**

COMMENTS:
First and foremost, it is not clear if this Certificate is, or if it is proposed to be, part of the Biological and Biomedical Engineering (BBME) Program. If it is, or would be, then the forum to discuss this Certificate is in the Executive (and Steering) Committee(s) of BBME. However, as there is no evidence that this Certificate is proposed to be part of the BBME (and indeed the absence of discussions in BBME Committees points to this conclusion), the following comments treat this proposal strictly as an inter-departmental (and inter-Faculty) matter.

There are four courses proposed to be taught by the Department of Bioengineering. Their likely enrollment, from the Bioengineering undergraduate program point of view, only, is as follows:
BIEN 510 Nanoparticles in the Med Science: 40 (Stream 1 and 2)
BIEN 520 High Throughput Biodevices: 40 (Stream 2 and 3)
BIEN 550 Biomolecular Devices: 20 (Stream 2)
BIEN 560 Biosensors: 20 (Stream 3)
However, these numbers are estimated, as we cannot guarantee that the students will split evenly between the 3 undergraduate streams; and also the undergraduate program is under current revision with consequences on the likely enrollment. Finally, the overall enrollment, presently estimated at 60, is likely to increase in the following years.

Additionally, these courses are offered to BBME graduate students, thus leading to an additional enrollment of 10 to 20 students per course. Additionally still, these courses have been offered and continue to be offered to other undergraduate students, mostly from Engineering programs. Finally, we aim to cap these courses at 60 (equivalent to our targeted enrollment for the undergraduate program).

To conclude, we can offer these courses, provided that there are available places before reaching the (estimated) cap of 60. The priority of filling the enrollment is as follows: undergraduate Bioengineering students, BBME students, undergraduate Engineering students, other McGill students.



Signature: _____

Date: **29. November 2016**_____