### New Program/Major or Minor/Concentration Proposal Form

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

| B.Sc. |  |

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

**Joint Honours in Computer Science and Biology**

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

|  |

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

|  |

#### 2.0 Administering Faculty/Unit

**Science**

#### 2.1 Offering Faculty/Department

**Science/ School of Computer Science; Biology**

#### 3.0 Effective Term of Implementation

(Ex. Sept. 2004 = 200409)

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<tr>
<th>Term</th>
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<tr>
<td>201609</td>
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#### 4.0 Rationale for new proposal

This is creating an Honours version of the existing Joint Major in Computer Science and Biology. The Honours program differs from the Major as follows: (i) it has 6 additional credits (MATH 240 and a 6-credit research course (COMP 402) instead of a 3-credit research course (COMP 401); (ii) Students are required to take COMP 252 instead of COMP 251; (iii) Students are required to maintain a GPA of 3.5 or above.

There are currently 63 students enrolled in the joint major. Of those, 25 have a CGPA of at least 3.5. Several students have already expressed interest for an Honours program, so in the short term we expect an enrolment of approximately 5-10 new students per year.

#### 5.0 Program Information

Please check appropriate box(es)

<table>
<thead>
<tr>
<th>5.1 Program Type</th>
<th>5.2 Category</th>
<th>5.3 Level</th>
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<td>Faculty Program (FP)</td>
<td>X Undergraduate</td>
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<td>Master’s</td>
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<td>Dentistry/Law/Medicine</td>
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<td>M.Sc. (Applied) Program</td>
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<td>Continuing Ed (Non-Credit)</td>
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<td>Internship/Co-op</td>
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#### 6.0 Total Credits

| 75-79 |

#### 7.0 Consultation with Related Units

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<tr>
<th>Yes</th>
<th>No</th>
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Financial Consult

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Attach list of consultations.
This honours program will train students in the fundamentals of biology - with a focus on molecular biology - and will give them computational and mathematical skills needed to manage, analyze, and model large biological datasets. It is structured along three optional streams: (1) Computational Molecular Biology and Genetics; (2) Computational Evolution and Ecology; (3) Computational Neurobiology. Two integrative features of the program are a three-credit joint independent studies course, and a one-credit seminar. Compared to its non-honours counterpart, the Honours program requires additional research credits and a larger number of advanced courses. Students must have and maintain a minimum CGPA of 3.5. Students may complete this program with a maximum of 79 credits or a minimum of 75 credits. This depends upon the student’s choice of required courses and whether or not the student is exempt from taking COMP 202.

Program prerequisites: To ensure they meet the core requirements of the program it is highly recommended that the following courses be selected by U0 students: BIOL 111-112, CHEM 110-120, MATH 133, MATH 140-141 or MATH 150-151, PHYS 101-102 or PHYS 131-142. Note that MATH 150-151 provides equivalence for required course MATH 222. It is also advisable to take COMP 202 during U0 if possible.

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

#### Required Courses (54-58 credits)

* *Note: Students with CEGEP-level credit for the equivalents of MATH 222 and/or CHEM 212 (see http://www.mcgill.ca/students/courses/plan/transfer for accepted equivalents) may not take these courses at McGill and should replace them with elective courses to satisfy the total credit requirement for their degree.*

**Required Mathematics and Statistics Courses**
- 15 credits from:
  - MATH 222 Calculus 3 (3 credits)*
  - MATH 223 Linear Algebra (3 credits)
  - MATH 240 Discrete Structures 1 (3 credits)
  - MATH 323 Probability (3 credits)
  - MATH 324 Statistics (3 credits)

**Required Computer Science Courses**
- 12-16 credits from:
  - COMP 202 Foundations of Programming (3 credits) **
  - COMP 266 Introduction to Software Systems (3 credits)
  - COMP 250 Introduction to Computer Science (3 credits)
  - COMP 252 Honours Algorithms and Data Structures (3 credits)
  - COMP 462 Computational Biology Methods and Research (4 credits) **
  - COMP 561 Computational Biology Methods and Research (4 credits) **

**Required Biology Courses**
- 20 credits from:
  - BIOL 201 Cell Biology and Metabolism (3 credits)
  - BIOL 202 Basic Genetics (3 credits)
  - BIOL 215 Introduction to Ecology and Evolution (3 credits)
  - BIOL 301 Cell and Molecular Laboratory (4 credits)
  - CHEM 212 Introductory Organic Chemistry 1 (4 credits)*

**Required Joint Courses**
- 7 credits from:
  - COMP 402D1 Honours Project in Biology and Comp. Science (3 credits)
  - COMP 402D2 Honours Project in Biology and Comp. Science (3 credits)
  - COMP 499 Undergraduate Bioinformatics Seminar (1 credit)

**Complementary Courses (21 credits)**
- At least 21 credits selected from the following blocks, with the following requirements:
  - at least 9 credits from each of the following two blocks
  - at least 9 credits at the 400 level or above
  - at least 3 credits at the 400 level or above from each block

**Computer Science Block**
- Note: All COMP courses at the 400 level or above (except COMP 400, 401, 499, 462, 561), COMP 273 Introduction to Computer Systems (3 credits)
- COMP 302 Programming Languages and Paradigms (3 credits)
- COMP 303 Software Development (3 credits)
- COMP 307 Principles of Web Development (3 credits)
- COMP 310 Operating Systems (3 credits)
- COMP 322 Introduction to C++ (1 credit)
- COMP 330 Theory of Computation (3 credits)

(continuation on the next column)
**10.0 Approvals**

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<th>Routing Sequence</th>
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Submitted by

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Dear Mathieu,

Your program change is fine with the Department of Mathematics and Statistics. If there is any paperwork to be taken care of, please contact Angie, her address is in cc.

Best regards, Vojkan Jaksic

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On Aug 29, 2015, at 9:53 AM, Mathieu Blanchette <blanchem@cs.mcgill.ca> wrote:

Thanks Vojkan!

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On Aug 29, 2015, at 8:10 AM, jaksic@math.mcgill.ca wrote:

This looks very good for me. I will just discuss it briefly with chair on Monday, and then come back to you.

Best, Vojkan

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On Aug 29, 2015, at 5:43 AM, Mathieu Blanchette <blanchem@cs.mcgill.ca> wrote:

Dear Vojkan,

Clark Verbrugge from CS gave me your contact info as Academic Committee Rep. in Math (if someone else has that responsibility, could you please forward this to him/her?).

We are preparing a revision to our Computer Science and Biology joint major. One of the proposed changes relates to MATH courses and may slightly impact enrolment, so I thought I should consult with you before moving forward with this. I’m attaching the program change form, but in a nutshell the change that relates to MATH courses is the following:

CS-Bio students used to have three choices to acquire Prob+stats material:

- MATH 203 and MATH 204
- MATH 323 and MATH 324
- BIOL 309 and BIOL 373.

We realized that only the MATH 323 and MATH 324 pair provide the adequate level for our students, so our proposal is to make these two courses required, and remove the other two pairs. This will have a slight impact on the enrolment for MATH 323+324. I say “slight” because the joint major only has 20-30 students per year, and until now most of these students were already taking 323+324 (we’ve been advising our students to do so for the past 3 years). So I would expect that the increase in enrolment would be about 5 students per year.

Could you let me know what you think about this possible change?

Also: we are proposing the creation of an Honours version of the program. The Honours version would be identical to the non-honours version in terms of the Math requirements. I do not expect this would translate in changes in terms of enrolment. Please let me know if you see any issue.

Thanks!

Mathieu

Dear Josie,

As you know we are proposing changes to the CS-Bio joint major, as well as the creation of the CS-Bio Honours. As per the email thread below, please find the confirmation that Biology was involved in the development of these proposals and has approved them.

Thanks

Mathieu

Begin forwarded message:

From: "Irene Gregory-Eaves, Prof." <irene.gregory-eaves@mcgill.ca>
Subject: Re: CS-Bio final documents
Date: October 19, 2015 at 5:00:41 PM GMT-4
To: Mathieu Blanchette <blanchem@cs.mcgill.ca>
Cc: Michael Langer <langer@cim.mcgill.ca>, "Nancy Nelson, Ms." <nancy.nelson@mcgill.ca>, "Jacalyn Vogel, Prof." <jackie.vogel@mcgill.ca>

Sorry - yes, biology approved the revisions & the BScH program. Matthieu do you have a consultation form I can send to me to make this more official?

Irene

Sent from my iPhone

On Oct 19, 2015, at 4:53 PM, Mathieu Blanchette <blanchem@cs.mcgill.ca> wrote:

Ah, sorry for dropping the ball… I have not heard from Irene regarding the fate of the proposals at the last Biology departmental meeting. I’m assuming it went through without issues?

Mathieu
On Oct 19, 2015, at 4:51 PM, Michael Langer <langer@cim.mcgill.ca> wrote:

Hi all,

Josie d'Amico just asked for confirmation that we are going ahead with this at the Faculty AC meeting next week. I will present the CS part, and I am assuming that the Irene (?) will present the Bio part.

I told Josie I would confirm with her by Wednesday this week that the proposal is ready, so please give me a heads up if there are any problems (like in the email thread below!).

Thanks all.

Mike

On 2015-10-06 10:45 AM, Mathieu Blanchette wrote:
HI Nancy,

I’m a bit confused:

I just realized that BIOL 111 is not included as a pre-req for the Joint Major and Honors in CompSci and Biology. But it is a pre-req for BIOL 215. The reason we haven't given a clear set of pre-reqs for the programs as we have proposed and revised them, is that the Freshman program is supposed to be 29-30 credits, with two BIOLs, Two MATH, two CHEM and two Physics. By adding MATH 133 we reach 32 credits. Faculty of Sci has told us that this is not permitted--should we check with Tamara Western?

Do you mean “By adding BIOL 111” instead of “By adding MATH 133”? MATH 133 is not currently listed in the program. Or is the problem caused by the addition of COMP 202 to the recommended course for U0 students? I note that it is not absolutely required to take COMP 202 in U0; it’s just advisable.

Mathieu
Hi Josie,
Here is the consultation from Neurology - Neurosurgery, needed for the CS-Bio proposed/revised programs.
Cheers,
ML

-------- Forwarded Message ---------
Subject:FW: PLEASE RESPOND RE: consultation report for NEUR 310
Date:Tue, 24 Nov 2015 13:36:42 +0000
From:Neurology - Neurosurgery <n-ns@mcgill.ca>
To:Michael Langer <langer@cim.mcgill.ca>
Hello Michael,

Sorry for the delay. Please see the approval from Neurology and Neurosurgery Chair, Dr. Guy Rouleau.

I am away from the office unexpectedly today, but if there is anything else, I will be checking my emails throughout the day.

Kind regards,
Sandra
Sandra Kadowaki
Administrative Affairs Assistant
Neurology & Neurosurgery
McGill University
Montreal Neurological Hospital

From: Guy Rouleau, Dr
Sent: Monday, November 23, 2015 4:24 PM
To: Neurology - Neurosurgery
Subject: RE: PLEASE RESPOND RE: consultation report for NEUR 310

Yes, OK

Guy Rouleau MD PhD FRCP(C) OQ
Director, Montreal Neurological Institute and Hospital and
Department of Neurology and Neurosurgery
McGill University

From: Neurology - Neurosurgery
Sent: November 23, 2015 3:59 PM
To: Guy Rouleau, Dr <guy.rouleau@mcgill.ca>
Subject: PLEASE RESPOND RE: consultation report for NEUR 310

Hi Dr. Rouleau,

The School of Computer Science and Dept of Biology are proposing a new Honours Program in Computer Science and Biology (Undergrad), and would also like to modify the existing Joint Majors Program in Computer Science and Biology; they would like to include NEUR 310 Cellular Neurobiology as a Complementary Course in these programs.
As you can see below, JF Cloutier, who is charge of this course, has given his ok to include it in their program. Michael Langer, Chair of the Academic Committee for the School of Computer Science, however, needs departmental approval as well. I asked David Ragsdale about this since he is involved in Undergrad teaching, and he suggested that I simply ask you for your “OK” on this. Are you alright with this course being included?

Thanks,

Sandra

Sandra Kadowaki  
Administrative Affairs Assistant  
Neurology & Neurosurgery  
McGill University  
Montreal Neurological Hospital

From: David Ragsdale, Dr.  
Sent: November-18-15 5:05 PM  
To: Neurology - Neurosurgery <n-ns@mcgill.ca>  
Subject: RE: consultation report for NEUR 310

Sandra:

This is (I think) the only undergraduate course offered by Neurology and Neurosurgery and is probably way Dr. Rouleau’s radar. I would guess that he has no idea about the content of the course and would not be in a position to judge its suitability for other programs.

Monroe Cohen coordinates the undergraduate neuroscience program, but that’s not a department, so if they insist on department approval that won’t do. Can we ask Dr. Rouleau to sign off on the course?

Dave

From: Neurology - Neurosurgery  
Sent: Wednesday, November 18, 2015 2:06 PM  
To: David Ragsdale, Dr. <david.ragsdale@mcgill.ca>  
Subject: FW: consultation report for NEUR 310  
Importance: High

Hello Dr Ragsdale,

I received the request below regarding the School of Computer Science and Dept of Biology who are proposing new Honours Programs, and also modifying the existing Joint Majors Program in Computer Science and Biology. They’d like to include NEUR 310 Cellular Neurobiology as a Complementary Course in these programs. JF Cloutier is responsible for these courses and has given his ok, but Michael Langer, the Chair for the Academic Committee in the School of Computer Science is requesting Departmental approval.
I asked Fraser Moore (involved in Neurology UGME) about this, and he suggested I ask you about this since you are very much involved in Undergraduate teaching in neuroscience. What would the protocol be in this kind of situation, in order to obtain departmental approval for what is being requested?

Many thanks,

Sandra

Sandra Kadowaki
Administrative Affairs Assistant
Neurology & Neurosurgery
McGill University
Montreal Neurological Hospital

From: Jean-Francois Cloutier, Dr.
Sent: November-18-15 10:42 AM
To: Michael Langer <langer@cim.mcgill.ca>
Cc: n-ns@mcgill.ca; Neurology - Neurosurgery <n-ns@mcgill.ca>
Subject: Re: consultation report for NEUR 310

Dear Michael,

As the coordinator of the Neur310 course, I do not have any objections to including this course as a complementary course in your program, as long as the Department approves it.

Sincerely,
JF

***********************************************************************
Jean-Francois Cloutier, Ph.D.
Associate Professor Dept. Neurology & Neurosurgery
Chercheur Boursier Sénior - FRQ-S
Montreal Neurological Institute
3801 University; Room MP105
Montréal, Québec H3A2B4
e-mail: jf.cloutier@mcgill.ca
tel: 514-398-6351
fax: 514-398-1319
***********************************************************************

On Nov 13, 2015, at 5:58 PM, Michael Langer <langer@cim.mcgill.ca> wrote:

Hello Sandra Kadowsky and Professor Cloutier,

The School of Computer Science and Dept of Biology are proposing a new Honours Program in Computer Science and Biology, and also modifying the existing Joint Majors Program in Computer Science and Biology.

As you can see from the attachments, we would like to include
NEUR 310 Cellular Neurobiology as a Complementary Course in these programs.

Could you please reply to this email and let us know if the Dept of Neurology and Neurosurgery has any Objections?

PS the email link on the mcgill website is n-ns@mcgill.ca which is probably not correct.

Thank you very much.

Michael Langer
Chair, Academic Committee
School of Computer Science
Faculty of Science, McGill U