**New Course Proposal Form**

1. **Will this new course affect a current program?**
   - Yes [ ]
   - No [x]

   If "yes", has a Program Revision Form been submitted concurrently?
   - Yes [ ]
   - No [x]

2. **Teaching Department:**
   - Physiology

3. **Administering Faculty/Unit:**
   - Science

4. **Campus**
   - (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify)
   - Downtown
   - Term: 200709

5. **Effective Term of Implementation**
   - (Ex. Sept. 2004 = 200409)
   - Term: 200709

6. **Responsible Instructor:**
   - Erik Cook and Peter Swain

7. **Course Title (Limit 30 Characters) - required for all courses:**
   - Analyzing Physiological Sys.

8. **Course Title to Appear in the Calendar (optional)**
   - Subject/course number: PHGY 425
   - Course(s) Span:
     - 1 term [x]
     - 2 consecutive terms (D1, D2)
     - 2 non-consecutive terms (N1, N2)
     - 3 consecutive terms (J1, J2, J3)

9. **Course Title to Appear in the Calendar (optional)**
   - (Limit 59 characters):
     - Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.
     - Analyzing Physiological Systems

10. **Credit Weight**
    - (or CEU's for non-credit CE courses):
    - 3

11. **Rationale for new course**
    - With the invention of new technologies, biological research is rapidly becoming a quantitative science. Two areas stand out: systems biology, the quantitative physiology of single cells, and computational neuroscience, connecting the brain’s biological machinery to information processing. This course will provide students with the tools to tackle these future challenges in physiology and medicine.

12. **Course Description**
    - (as it will appear in the Calendar [maximum 50 words]):
      - (N.B. Faculty of Medicine must append complete course outline)
      - An introduction to quantitative analysis of physiological data, both to the mode of thinking and to a set of tools that allows accurate predictions of biological systems. Examples will range from oscillating genetic networks to understanding higher brain function. Modelling and data analysis through examples and exercises will be emphasized.

13. **Supplementary information to appear in the Calendar in addition to the course description.**
    - Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc.
    - Please enter the information as it should appear in the calendar notes.
    - Enrolment limited to 20 students.
14. Schedule Types(s):
(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Lab</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
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</tbody>
</table>

Total Hours per Week: 3
Total Number of Weeks: 13

15. Projected Enrolment:
20

16. Required text and/or preliminary reading list sent to library?
☐ Yes  X No

17. Prerequisite(s) (Courses or Tests)
Specify course number(s) or name(s) of test(s):
PHGY 311, PHGY 314, BIOL 200
Or permission from instructor.

If the student does not have a prerequisite should web registration be blocked?
☐ Yes  ☐ No

If “Yes” complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
☐ Yes  ☐ No

18. Corequisite(s) Course Number(s):
Specify course number(s) and title(s):

If the student does not register for the corequisite in the same term should web registration be blocked?
☐ Yes  ☐ No

19. Restriction(s):

20. Consultation Reports Attached
☒ Yes  ☐ N/A

21. Additional Course Charges (must be approved by the Fee Policy Committee)
Description of Fee
(e.g. screening fee) Amount

22. Requires Teaching, Physical, or Financial Resources
Not Currently Available (attach explanation)
☐ Yes  ☒ No
### 23. Approvals:

<table>
<thead>
<tr>
<th>Routing Sequence</th>
<th>Departmental Meeting</th>
<th>Departmental Chair</th>
<th>Other Faculty</th>
<th>Curric/Academic Committee</th>
<th>Faculty</th>
<th>SCTP</th>
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<td>Name</td>
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Departmental Contact Person (name/phone/email) 

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- Thesis Component: [ ] Yes [ ] No

To be completed by ARR
- CIP Code

For Continuing Education Use
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- Flat Rate: CdnFlat Rate: [ ] Yes [ ] N/A

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Week 1 – 3: Systems biology of circadian rhythms

Week 4 – 6: Analysis of molecular mechanisms
Modeling of synaptic transmission and calcium dynamics. Diffusion in confined space with a chemical reaction. Continuous modeling, Monte Carlo simulation and molecular dynamics.

Week 7 – 9: Analysis of neurophysiological activity
Statistical approaches to the analysis of neural data. Reverse correlation and receptive field estimation. Stimulus reconstruction. Introduction to information theory.

Week 10 – 12: Analysis of higher brain function.

Week 13: Student project presentations.

Reading List
Theoretical neuroscience' by P. Dayan and L.F. Abbot (MIT Press, 2001)
An introduction to systems biology' by U. Alon (Chapman & Hall, 2007)

Grading scheme
Each module will have a take-home assignment worth 15% (total 60% over the 4 modules). In addition, each student must write a term paper (30%) and give a 10 minute presentation (10%) on a topic approved by the course coordinator. The term paper should involve a literature survey and some computational modelling.

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information). The Dept. of Physiology will not tolerate any academic offences with regard to cheating and plagiarism. See A Student’s Rights and Responsibilities at www.med.mcgill.ca/secretariat.documents for details.