May 15, 2014

MEMORANDUM

TO: John Townshend
   Dean, College of Behavioral and Social Sciences

FROM: Elizabeth Beise
       Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to Modify Ph.D. in Neuroscience and Cognitive Science (PCC log no. 13043)

At its meeting on March 7, 2014, the Senate Committee on Programs, Curricula, and Courses approved your proposal to modify the Ph.D. in Neuroscience and Cognitive Science. A copy of the approved proposal is attached.

The change is effective Fall 2014. Please ensure that the change is fully described in the Graduate Catalog and in all relevant descriptive materials.

MDC/

Enclosure

cc: Marilee Lindemann, Chair, Senate PCC Committee
    Barbara Gill, Office of Student Financial Aid
    Reka Montfort, University Senate
    Erin Howard, Division of Information Technology
    Pam Phillips, Institutional Research, Planning & Assessment
    Anne Turkos, University Archives
    Linda Yokoi, Office of the Registrar
    Alex Chen, Graduate School
    Wayne McIntosh, College of Behavioral and Social Sciences
    Jens Herberholz, Neuroscience and Cognitive Science
The NACS faculty proposes the following curriculum changes to reduce the volume of obligatory course load that students need to complete and to increase supervised time spent in the laboratory during the first year developing critical skills.

- **Reduce** the obligatory course load by moving the 4-credit first year lecture course (NACS641) to the list of optional core courses
- **Replace** the NACS 641 obligatory course with a 2-credit Foundational Readings Seminar course and a First Year Research Project
- **Make it** an official requirement for students to take at least one Cognitive Science related course and at least one Neuroscience related course

**Departmental/Unit Contact Person for Proposal:** Pam Komarek

---

**APPROVAL SIGNATURES - Please print name, sign, and date. Use additional lines for multi-unit programs.**

1. Department Committee Chair  
   Richard Payne  
   12-10-13

2. Department Chair  
   Jens Herberholz  
   12-11-13

3. College/School PCC Chair  
   Charles Stangor  
   1/6/14

4. Dean  
   Wayne LeSage  
   2/1/14

5. Dean of the Graduate School (if required)  
   3/25/14

6. Chair, Senate PCC  
   3/7/14

7. University Senate Chair (if required)  
   Elizabeth Price  
   5/15/2014

8. Senior Vice President and Provost  
   5/15/2014
Overview of NACS Program

The Neuroscience and Cognitive Science (NACS) doctoral program is a campus-wide PhD program that crosses 14 departments in seven colleges (AGNR, ARHU, BSOS, CMNS, EDUC, ENGR, and SPH). Approximately 100 faculty participate in NACS. Currently 53 students are in the program and 56 students have graduated from the program.

The NACS program’s overall mission is threefold: (1) to provide a core of research and training opportunities for graduate students in neuroscience and cognitive science; (2) to provide formal structures for facilitating interaction and collaboration across disciplines and across the NACS core and the associated disciplines; (3) to foster communication among the diverse elements of the NACS community.

Current (old) requirements
- Coursework
  - Two required courses
    - NACS 600 Ethics in Scientific Research
    - NACS 641 Introduction to Neuroscience
  - Three of the following four courses
    - NACS 642 Cognitive Neuroscience
    - NACS 643 Computational Neuroscience
    - NACS 644 Cellular and Molecular Neuroscience
    - NACS 645 Cognitive Science
  - Three supplemental courses (minimum of 9 credits)
- Qualifying Exam
- Dissertation Proposal
- PhD Defense

Proposed (new) requirements (changes underlined)
- Coursework
  - Two required courses
    - NACS 600 Ethics in Scientific Research
    - NACS640 Foundational Readings Seminar
  - Three of the following five courses (one course from each area)
    - Cognitive Area
      - NACS 642 Cognitive Neuroscience
      - NACS 645 Cognitive Science
    - Neuroscience Area
      - NACS 641 Introduction to Neuroscience
      - NACS 643 Computational Neuroscience
      - NACS 644 Cellular and Molecular Neuroscience
  - Three supplemental courses (minimum of 9 credits)
- First Year Research Project
- Qualifying Exam
- Dissertation Proposal
- PhD Defense
Identification of and rational for the changes

Overview of the Changes

The NACS faculty has voted to approve the following curriculum changes in an effort to continue to focus on the mission of the NACS program. The intention of these changes is to reduce the volume of obligatory course load that students need to complete and to increase supervised time spent in the laboratory during the first year developing critical skills.

The obligatory 4-credit first year lecture course, Introduction to Neuroscience (NACS 641), will be moved to a list of five core courses, three of which are to be completed before preliminary exams are taken. We expect that students without any background in Neuroscience at the upper undergraduate level will still take the introductory course (NACS 641), but the new arrangement allows students with enough background to take the other more specialized courses on the list immediately with the permission of the Instructor. The original requirement for NACS 641 will be replaced by a two-credit Foundational Readings course and a First Year Research Project.

The First Year Research Project will provide additional research and training opportunities for our students (part 1 in our mission statement). It will provide an early opportunity for students to get feedback on written and oral presentations of their work. It will help launch students in their careers as independent thinkers and scientists. One of the best ways for students to learn the skills and strategies of research is to be immersed in day-to-day research activities and an independent project.

Detailed Description of the First Year Research Project

NACS students will engage in a research project in their first year that culminates in a written report and oral presentation to their committee members. The project selected must be one that can be conceived and completed within the first academic year. Upon entering the Program, students performing rotations should consult with their advisors as to where the project is to be performed and are encouraged to engage in a project that links their work.

Students are required to meet with their committee three times in their first year. The first meeting must occur by the end of September. The second meeting must occur by the end of February. The presentation of the research report will constitute a third meeting at the end of September of the student’s second year.

Projects may involve empirical or theoretical research, and the discipline-specific details are developed by the student, his/her adviser and input from the committee. The project must be submitted as a brief journal-style research report. It is not intended that the project be exhaustive—a single repeatable experiment with controls would be sufficient. Solid negative results, control experiments or metadata are also permissible, provided that the report elaborates on how those results lay the groundwork for future experiments. The project should not be a literature review, but any references in the report may later become part of the student’s qualifying exam reading list.
The student will give an oral presentation of the research project to the committee shortly after the end of the student’s first year.

The student’s adviser and committee will evaluate the written report and the oral presentation. Grading of the entire research project (written report and oral presentation) will occur at the oral presentation and will be as High Pass, Pass, Marginal Pass, or Fail.

Students are encouraged to present a poster of their research project at a NACS event within the student’s second year. Students who receive a High Pass will be eligible for travel support from the program to present their research at a national conference.

A grade of Fail will initiate a discussion between the program and the advisor as to whether the student should continue in the program. The student can appeal the outcome of a grade of Fail to the Graduate Director.

**NACS640 course: Foundational Readings Seminar**

In an effort to provide an opportunity to introduce NACS students to the breadth of research in our program and to encourage complete and critical reading of the literature, the NACS faculty voted to create a Foundational Readings Seminar course that all incoming students will be required to take in their first semester.

NACS faculty will select classic papers on topics in their disciplines to provide historical context and introduction to important issues in their fields of research. Faculty will attend the seminar in which their selected papers are discussed. Each student participant will lead discussion of paper(s) in one class meeting.

Below is a sample outline for the course:

<table>
<thead>
<tr>
<th>Date</th>
<th>Faculty</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/3</td>
<td>William Hodos</td>
<td>Perspectives</td>
</tr>
<tr>
<td>9/10</td>
<td>Katrina MacLeod</td>
<td>Synaptic transmission</td>
</tr>
<tr>
<td>9/17</td>
<td>Colin Phillips</td>
<td>Language processing</td>
</tr>
<tr>
<td>9/24</td>
<td>Jens Herberholz</td>
<td>Electrical synapses/transmission</td>
</tr>
<tr>
<td>10/1</td>
<td>Mary Ann Ottinger</td>
<td>Hormones and behavior</td>
</tr>
<tr>
<td>10/8</td>
<td>Elizabeth Quinlan</td>
<td>Synaptic plasticity</td>
</tr>
<tr>
<td>10/15</td>
<td>DJ Bolger</td>
<td>fMRI research and CogNeuro</td>
</tr>
<tr>
<td>10/22</td>
<td>Thomas Carlson</td>
<td>Brain decoding</td>
</tr>
<tr>
<td>10/29</td>
<td>Elizabeth Redcay</td>
<td>Developmental Cognitive Neuro theories</td>
</tr>
<tr>
<td>11/5</td>
<td>Nathan Fox</td>
<td>Social and emotional development</td>
</tr>
<tr>
<td>11/12</td>
<td>SFN meeting, no class</td>
<td></td>
</tr>
<tr>
<td>11/19</td>
<td>Dan Butts</td>
<td>Neural coding</td>
</tr>
<tr>
<td>11/26</td>
<td>Matt Kelley</td>
<td>Peripheral auditory system</td>
</tr>
<tr>
<td>12/3</td>
<td>Jonathan Fritz</td>
<td>Neural plasticity and attention</td>
</tr>
<tr>
<td>12/10</td>
<td>Daphne Soares</td>
<td>Neuroethology</td>
</tr>
</tbody>
</table>
This course requirement will provide a formal structure for facilitating interaction and possible collaboration across NACS core disciplines (part 2 in our mission statement), as well as provide an opportunity to foster communication among NACS faculty and students (part 3 in our mission statement). The exposure to the breadth of research in our program may also foster student interest in looking into other research and training opportunities (part 1 in our mission statement).

Cognitive and Neuroscience Course Areas

The NACS program is a program in Neuroscience and Cognitive Science. NACS students take a series of core courses designed to provide a broad training in both areas (neuroscience and cognitive science) so that they learn to appreciate the breadth of the field. In an effort to strengthen the importance of this training in both neuroscience and cognitive science, we would like make it an official requirement that students must take at least one course from each area. Although all NACS students currently do take courses in both areas, we propose this change to make it an official part of the curriculum.

NACS641: Introduction to Neuroscience course

Currently the NACS641 course is a required course. With the addition of the NACS640 Foundational Readings Seminar, the NACS641 course will no longer be a required course, but instead will become one of five other NACS courses that students can take to fulfill their requirement for the three additional NACS courses.

Since we will now have a Cognitive Course Area and a Neuroscience Course area (mentioned above), it seems logical and appropriate to place the NACS641 course with the other neuroscience courses under the Neuroscience Course Area.

Since NACS641 is a prerequisite for NACS643: Computational Neuroscience and NACS644: Cellular and Molecular Neuroscience, we imagine that most NACS students will still take NACS641. However, we want it to be an optional course, not a required course.

Sample program under the proposed requirements

Year One
Fall:  
NACS640: Foundational Readings Seminar (2 credits); no prerequisite  
NACS641: Introduction to Neuroscience (4 credits); no prerequisite  
Begin First Year Research Project

Spring:  
NACS600: Ethics in Scientific Research (2 credits); no prerequisite  
NACS644: Cell and Molecular Neuroscience (4 credits); prerequisite NACS641  
Complete First Year Research Project

Year Two
Fall:  
NACS645: Cognitive Science (4 credits); no prerequisite  
First supplemental course (3-4 credits)

Spring:  
Second supplemental course (3-4 credits)  
Third supplemental course (3-4 credits)
Year Three
Qualifying Exam

Year Four
Dissertation Proposal Defense and Advance to Candidacy

Year Five
PhD Defense

Acknowledgement regarding students currently enrolled

Students enrolled in the NACS program prior to the effective date of this curriculum change may complete their program under the old requirements if they wish.