June 7, 2013

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 the Master of Science in Neurosciences and Cognitive Sciences (PCC log no. 12059)

At its meeting on May 3, 2013, the Senate Committee on Programs, Curricula and Courses approved your proposal to modify the Master of Science in Neurosciences and Cognitive Sciences. A copy of the approved proposal is attached.

The change is effective immediately. Please ensure that the change is fully described in the Graduate Catalog and in all relevant descriptive materials, and that all advisors are informed.

MDC/
Enclosure

cc: William Idsardi, Chair, Senate PCC Committee
Sarah Bauder, 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
Robert Dooling, Neurosciences and Cognitive Sciences
THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM/UNIT PROPOSAL

- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.
- Please submit the signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.

College/School:
Please also add College/School Unit Code-First 8 digits: 1280101
Unit Codes can be found at: https://hypprod.umd.edu/Html_Reports/units.htm

Department/Program:
Please also add Department/Program Unit Code-Last 7 digits: 1280106

Type of Action (choose one):
- Curriculum change (including informal specializations)
- Renaming of program or formal Area of Concentration
- Addition/deletion of formal Area of Concentration
- Suspend/delete program

Italics indicate that the proposed program action must be presented to the full University Senate for consideration.

Summary of Proposed Action:
Activate the MS degree in Neuroscience and Cognitive Science (NACS) and formalize the curricula for the thesis and non-thesis options. The authority to offer the MS degree was approved by MHEC in 1996 but it has not been used. Students will continue to only be admitted to the PhD program, but students who wish to earn one of the two MS degrees (non-thesis or thesis) in route to the PhD can apply for the MS degree. Students who do not want to earn an MS degree will simply obtain a PhD degree at the end of their graduate study. Students who, for one reason or another, need to leave the program before completing the doctorate can also apply for the non-thesis MS degree or the thesis MS degree.

APPROVAL SIGNATURES - Please print name, sign, and date. Use additional lines for multi-unit programs.
1. Department Committee Chair
   Cynthia Mass, May 26, 2013
2. Department Chair
   Robert Deering, July 29, 2013
3. College/School PCC Chair
   Martha E. Geores
4. Dean
   Katherine Pedro Bowers
5. Dean of the Graduate School (if required)
   June
6. Chair, Senate PCC
   L.J. (June)
7. University Senate Chair (if required)
8. Senior Vice President and Provost
   Alyson Hearn

PCC LOG NO. (To be issued by the Office of Associate Provost for Academic Planning and Programs)
12059
I. OVERVIEW and RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it. [You may want to refer to student demand, market demand for graduates, institutional strengths, disciplinary trends, synergy with existing programs, and/or institutional strategic priorities.]

The Neuroscience and Cognitive Science (NACS) doctoral program 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 53 students have graduated from the program.

While NACS is a doctoral program and will continue to only accept students who intend to receive a PhD degree, our experience since the program’s inception has shown that some students are interested in obtaining an MS degree along the way to the PhD. We hear this from potential recruits and also from enrolled students. These students would like the opportunity to have the additional credential on his or her vitae, or they view that obtaining a MS degree can serve as a viable fallback option should life situations necessitate withdrawing from the program. Many Neuroscience programs offer an MS degree in route to the PhD. Example institutions include University of California at Los Angeles, Brown University, University of Pittsburgh, Georgia State University, Duke University, and University of Texas at Dallas.

The NACS faculty members have voted and propose that the NACS program offer both an optional non-thesis MS degree and an optional thesis MS degree. Students who wish to earn one of the two MS degrees (non-thesis or thesis) in route to the PhD can apply for the MS degree. Students who do not want to earn an MS degree will simply obtain a PhD degree at the end of their graduate study. Students who, for one reason or another, need to leave the program before completing the doctorate can also apply for the non-thesis MS degree or the thesis MS degree.

The authority to offer an MS degree was given to the institution soon after the original approval of NACS by MHEC in 1996. The purpose of the current proposal is to formalize the degree requirements and to obtain University approval to actually grant the degree.

The NACS faculty members feel strongly that by offering an optional non-thesis MS degree and an optional thesis MS degree we do a considerable service to the students, NACS, and to the University. We recognize that there are times when students seek an advanced degree to bolster their credentials while they are obtaining their PhD. For students who need to leave the program, having an MS degree will help in career placement and advancement.

We again want to emphasize that students will not be considered for direct admission to the NACS Master’s program. We strongly believe, however, that adding the option of earning a non-thesis MS degree and the option of earning a thesis MS degree will strengthen the NACS program, aid in the recruitment of outstanding students, and recognize the work of our enrolled students.

B. How big is the program expected to be? From what other programs serving current students, or from what new populations of potential students, onsite or offsite, are you expecting to draw?

While it is hard to predict the number of students who would request to earn one of the two proposed MS degrees, we expect that not more than 25% of students will apply for an MS degree in route to the PhD. For students who want to leave the program with an MS degree, it is likely that no more than one or two students would seek the MS degree at any time or in any year.
II. CURRICULUM

A. Provide a full catalog description of the proposed program, including educational objectives and any areas of concentration.

The program offers both an optional non-thesis MS degree and a thesis MS degree in route to the PhD. The requirements for the non-thesis MS degree include a total of 31 credits (16 credits in core courses; 12 credits in elective courses; and 3 research credits), and the completion of a written Research Project and an oral presentation of the Research Project. The requirements for the thesis MS degree include a total of 31 credits (16 credits in core courses; 12 credits in elective courses; and 3 research credits), and the passing of an oral defense of thesis.

B. List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

Coursework for non-thesis MS degree and thesis MS degree
Students will take 3 credits of NACS research work. The 28 credits in coursework must be in NACS or NACS-related areas, and of these, at least 20 must be at the 600 level and above, and no courses may be below the 400 level. Students must maintain a cumulative grade point average of 3.0.

- All MS students must take the following two courses (4 credits):
  - NACS728R: Foundational Readings in Neuroscience and Cognitive Science (2 credits)
  - NACS600: Ethics in Scientific Research (2 credits)
- They must also take three of the following 4-credit NACS courses (12 credits):
  - NACS641: Introduction to Neurosciences
  - NACS642: Cognitive Neuroscience
  - NACS643: Computational Neuroscience
  - NACS644: Cellular and Molecular Neuroscience
  - NACS728Y: Introduction to Cognitive Science
- In addition, they must take 12 credits in elective courses approved by NACS and the student's committee. An example of some of the potential elective courses is attached. These courses are already accepted for the doctoral program, and thus there is no need for additional approval by the departments offering the courses.

Research Project for MS degree without thesis
NACS requires all doctoral students to complete a research project in their first year. This research project culminates in a written report and an oral presentation to the student’s committee. Projects may involve empirical or theoretical research, and the discipline-specific details are developed by the student, his/her advisor, and input from the committee. Students are expected to complete the research project requirement by the end of the summer following their first year in the NACS Program. Students who wish to earn a non-thesis MS degree will be asked to expand upon the write-up of their research project in order for it to count for the non-thesis MS degree. That is, while the research project should have been completed, the write-up of the project required for the non-thesis MS degree would be more substantial than that for the required first-year project.
MS degree with thesis
Students who pursue the thesis MS degree must pass an oral examination defending the thesis and covering all course material. Approval of the thesis is the responsibility of the student’s Examining Committee.

C. Describe any selective admissions policy or special criteria for students selecting this field of study.

An MS degree will be granted to those students who elect to earn a non-thesis MS degree or a thesis MS degree and who complete the requirements of the selected degree option. We imagine that students who pursue the non-thesis MS degree or the thesis MS degree will complete the degree no sooner than the end of their second year in the program.

III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. List the program’s learning outcomes and explain how they will be measured.
B. Include a general assessment plan for the learning outcomes. (In lieu of a narrative for both IIIA and IIIB, you may attach the program’s learning outcomes assessment forms.)

The Graduate Outcome Assessment (GOA) form for the NACS program is attached. NACS students and their committees are required to complete a GOA form at the following meetings/milestones:

- Annual Committee Meetings
- Oral Presentation of Research Project
- Qualifying Examination
- Dissertation Proposal
- Doctoral Examination Defense

Students who pursue the non-thesis MS degree and their committees will complete a GOA at the oral presentation of the expanded MS Research Project. Students who pursue the thesis MS degree and their committees will complete a GOA at the oral defense of the thesis.

IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program? [This might be a department, a departmental subgroup, a list of faculty members, or some other defined group.]

Academic direction and oversight for the program will be provided by the NACS Program Director, the NACS Graduate Director, the NACS Assistant Director, and Faculty in the NACS Program.

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure. This should include at least the following:

   i. Participating units.

   ii. Academic home and reporting relationship of the program director.

   iii. Composition and authority of a faculty oversight committee. Process for appointment of this committee.
iv. Process for assigning faculty to needed courses, and agreements with departments for releasing faculty or for allowing faculty overload for this purpose. Source for teaching assistants, if needed.

v. Arrangements for student advisement. For a graduate program, arrangements for research mentoring, assistantships, laboratory access, access to other resources, etc., as applicable.

vi. Process for recommending and proposing program changes. Process and schedule for program review.

NACS is an interdepartmental program that has an established PhD program structure. Since students who earn an MS degree will enter as PhD students, the arrangements for these students will be the same as for the PhD program.

V. OFF CAMPUS PROGRAMS

A. If the program is to be offered to students at an off-campus location, with instructors in classrooms and/or via distance education modalities, indicate how student access to the full range of services (including advising, financial aid, and career services) and facilities (including library and information facilities, and computer and laboratory facilities if needed) will be assured.

The program will not be offered at an off-campus location.

B. If the program is to be offered mostly or completely via distance education, you must describe in detail how the concerns in Principles and Guidelines for Online Programs are to be addressed.

The program will not be offered via distance education.

VI. OTHER ISSUES

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

The NACS program was originally established as tri-campus program, drawing on faculty and facilities at University of Maryland at Baltimore (UMB), University of Maryland at Baltimore County (UMBC), and University of Maryland College Park (UMCP). Although the three programs remain in active contact with each other, we each function primarily as separate programs. Since we were established as a tri-campus program, we have discussed with UMB and UMBC our proposal to establish a MS degree in NACS at UMCP. Dr. Michael Shipley from UMB agrees with and endorses our proposal to add a NACS MS degree. In addition, Dr. Steven Miller and other NACS faculty from UMBC support our proposal to add a NACS MS degree and in fact are considering adding a MS degree that UMBC NACS students can earn as well.

B. Will the program require or seek accreditation? Is it intended to provide certification or licensure for its graduates? Are there academic or administrative constraints as a consequence?

The program will not seek accreditation. It is not intended to provide certification or licensure for the graduates. There are no academic or administrative constraints as a consequence.
VII. COMMITMENT TO DIVERSITY

Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

There is no recruitment involved in the non-thesis MS degree or the thesis MS degree; all recruitment is to the existing Ph.D. program.

VIII. REQUIRED PHYSICAL RESOURCES

A. Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff.

Additional library and other information resources are not required for the proposed program.

B. Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc.

Additional facilities, faculty modifications, and equipment are not required.

C. Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers.

There will be no impact on the use of existing facilities and equipment.

IX. RESOURCE NEEDS and SOURCES

Describe the resources that are required to offer this program, and the source of these resources. Project this for five years. In particular:

A. List new courses to be taught, and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.

The teaching of new courses will not be required for the proposed program, and additional sections of existing courses will not be needed. We do not anticipate that the advising and administrative loads will increase substantially.

B. List new faculty, staff, and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them.

New faculty, staff, and teaching assistants will not be needed.

C. Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.

There will be no increase in teaching duties and little increase in advising and administrative duties.
D. Identify the source to pay for the required physical resources identified in Section VIII above.

No required physical resources were identified in Section VIII.

E. List any other required resources and the anticipated source for them.

No other resources will be required.
Examples of Potential Elective Courses

BIOL708E Advanced Topics in Biology: Diseases of Nervous System
This advanced course covers the function and organization of the nervous system as revealed by pathology and disease.

BIOL744 Neurophysiology
This course covers the physiology of nerves, muscles, sensory receptors, and aspects of central nervous system physiology.

EDHD775 Human Development and Neuroscience
Course focuses on the biological bases of human behavior including physiological processes which have an impact on human development.

HESP602 Neurological Basis of Human Communication
Basic neurology as it pertains to anatomical and physiological substrates of speech and language.

KNES689X Special Problems in Kinesiology: Exercise & Brain Health
A critical review of the evidence, from animal models to human MRI, for exercise to affect brain function and brain health; the neurophysiological mechanisms of exercise to alter neuronal function, including its potential neurogenic and angiogenic effects, with a focus on putative adaptations within brain networks related to emotion, memory, and executive function after acute and chronic exercise in health and disease.

LING640 Psycholinguistics
This is a core graduate course in psycholinguistics, covering leading theoretical approaches and experimental methods in language acquisition, language processing, and neurolinguistics.

LING641 Issues in Psycholinguistics
Students in the course will examine topics of current interest in psycholinguistics, including both theoretical approaches and experimental and analytical issues in language acquisition, language processing, and neurolinguistics.

LING646 Cognitive Neuroscience of Language
This course is an overview of classical and recent work on the neural basis of speech and language, with a goal of introducing contemporary methods and results to prepare the student to read the neurolinguistics and cognitive neuroscience literature. An emphasis will be placed on current techniques.

NACS728B Selected Topics in Neuroscience and Cognitive Science: Quantitative Analysis of Biological Data
This course teaches methods of analysis for time series and other data, including spatial data. Analysis methods include signal processing, statistics, and simple modeling. Matlab programming is taught and used throughout the course. Topics include data smoothing, Fourier/frequency analysis, spectrograms, and bootstrap error estimation.

NACS728D Developmental Cognitive Neuroscience
Developmental cognitive neuroscience investigates the relations between neural and cognitive development. This course provides an overview of current research questions, methodologies and findings related to neurocognitive development in human infants and children, the role of developmental plasticity, and atypical outcomes, such as those observed in neurodevelopmental disorders.
NAC5728I Seminar in Translational Neuroscience
To orient students toward the need for translational research in biomedical sciences; to provide examples of how prominent scientists incorporate applied/translational aspects into their research; to provide training in research development and grantsmanship with a translational perspective. Classes will consist of discussions, presentations by students, and seminars by scientists in the field.

NAC5728Q Biological Bases of Behavior Laboratory
This course explores the anatomical and physiological systems that underlie animal behavior using current neuroanatomical and neurophysiological techniques.

PSYC489G Introduction to Behavioral Endocrinology
This course is a study on the interactions among hormones, the brain, and behavior. The field of behavioral endocrinology is an interdisciplinary field, involving the study of phenomena ranging from genetic, molecular, and cellular levels of analysis to the study of individual and social behaviors. The course will be presented in a lecture-style format, with the aid of wonderful videos and animations which will help illustrate some of the behavioral and physiological concepts discussed during the lectures.

PSYC764 Comparative Neuroanatomy
This course is a survey of the evolution and overall anatomical organization of the central nervous systems of the major vertebrate taxa. Topics will include the phylogeny and diversity of vertebrate brains, their gross and microscopic anatomy, cell structure, embryological development, and the cranial nerves and major brain systems. Also discussed will be such theoretical issues as homology of brain structures, theories of brain evolution, and the origins of the vertebrate brain.

PSYC789L Topics in Language and Cognition
Graduate seminar covering selected topics in language processing. In Fall 2011, this will be a seminar introducing the study of language production, which is still perhaps the least researched of the "psycholinguistic trinity" (comprehension, production, and acquisition). The course will involve readings and discussions of various aspects of language production with a focus on theoretical controversies.

PSYC798D Graduate Seminar: Human Neuroanatomy
This course is a survey of the anatomy of the human central nervous system. Among the topics covered are the gross anatomy of the nervous system; the meninges and cerebral circulation; the spinal cord and cranial nerves; sensory systems; motor systems including the corpus stratum and cerebellum; the hypothalamus and neuroendocrine system; the autonomic nervous system; the limbic system and cerebral cortex. Each topic will include a discussion of the major neurological disorders associated with that system and their symptoms.

PSYC798L Graduate Seminar: The Biopsychology of Aggression
The primary goal of this seminar is to explore recent advances in the study of animal and human aggression. We will discuss the genetic contributions to aggression, the involvement of neuromodulators and hormones, the ontogeny of aggression and violence, and the psychopharmacology and psychophysiology of human aggression.

PSYC798R Development of the Social Brain
This is a graduate seminar focusing on topics in developmental social cognitive neuroscience. We will examine the extent to which distinct brain systems become (or start out) specialized for different social processes. Discussion will cover topics such as the development of action understanding, theory of mind, communication, empathy, and prosocial behavior from a developmental cognitive neuroscience perspective. This course will additionally include discussion of atypical social brain development by focusing on current research in autism spectrum disorders.
The NACS GOA was approved at the NACS faculty meeting on December 15, 2011. We began using the GOA form in January 2012.

The “limited number of discrete points in their doctoral training” at which NACS will assess our PhD students are:

1. All annual meetings with the student’s advisory committee.
2. The oral defense of the qualifying exam.
3. The dissertation proposal defense.
4. The dissertation defense.

The mechanism that NACS will use for reporting the Graduate Outcome Assessments will be a one page form (see page 2 of this document).

The criteria that NACS believes are crucial to the ultimate success of our PhD students are:

1. Knowledge of relevant previous research.
2. Facility with relevant technical skills.
3. Creativity in proposing new research directions.
4. Ability to critically evaluate and test research hypotheses.
5. Making timely progress on research.
6. Clarity and effectiveness in written presentations (exams, dissertation, articles).
7. Clarity and effectiveness in oral presentations (defenses, conference presentations).
8. Overall intellectual merit of research.
9. Can articulate broader impacts of research.

The rubric that NACS believes codifies and exemplifies the standards set out on the GOA form is:

1. An assessment that the student does not meet/meets/exceeds expectations.
2. Space for comments and for examples of instances where the student did not meet, met, or exceeded expectations.
**Review and use of assessments:**

Learning outcome assessments provide a mechanism for evaluating BOTH the student AND the department. The assessments incorporate different faculty members’ perceptions, and can be used to provide the student with general feedback as to his or her strengths and weaknesses in each area. Moreover, comparing the students’ self-evaluation with the evaluation of his/her committee will serve as an additional form of student feedback.

However, summaries across different students’ rubrics can subsequently be used to provide the program with feedback as to areas in which it is succeeding or struggling in its academic training of students.

Rubrics will be assessed in sets, based on the evaluation point (i.e., qualifying exam vs. dissertation proposal) and year in program. This subdivision by timepoint is necessary because we would not expect students at different time points to have reached the same state in their graduate development. Moreover, in terms of evaluating the success of the graduate training program, it is far more of a concern if students are not meeting expectations in a particular domain in their 3rd or 4th year than it is if they are not meeting those expectations in their first year (when we have had less time to train them). Thus, it is necessary to consider these rubrics relative to the point in the program at which they were collected.

The DGS is responsible for using information from these rubrics as the basis for evaluating the program. This will occur on a yearly basis if a minimum of 10 rubrics from a particular evaluation point have been collected, or every other year, whichever occurs last. This latter requirement is to avoid overemphasis of individual cases.

The DGS will summarize patterns across these rubrics, and bring a report of findings to the curriculum committee, who will deliberate on the best means of addressing areas of consistent weakness across students. The DGS, in combination with the curriculum committee, will provide general feedback to the faculty at the next regular faculty meetings as to what is going well vs. what is going less well, along with recommendations for changes to the program.
**NACS Graduate Outcome Assessment (GOA) worksheet**

Please provide brief comments. For annual meetings action items should be part of the yearly plan described on the annual meeting form.

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Additional comments: