Graduate Council Curriculum Report

The Graduate Council Curriculum Report (GCCR), which includes all graduate curricular proposals approved through the Graduate Council curricular review process, is published 12 times each calendar year.

Questions/comments regarding the GCCR or its contents may be directed to the Director of Graduate Education Administration.

August 9, 2017

Graduate Degree Programs

CHANGE

Anthropology – change degree requirements (College of the Liberal Arts), page 4

Neuroscience – adopt dual-title in Clinical and Translational Sciences for the Ph.D. (College of Medicine), page 14

Neuroscience – add a joint M.D./Ph.D. degree program (College of Medicine), page 30

Graduate Courses

ADD

PSY 535
Research Methods in I/O Psychology
I/O RSRCH METHODS (3)
This seminar is designed to help students develop a broad understanding of applied research by exposing them to the various research methods commonly used in Industrial/Organizational Psychology. The objectives for the course include: 1) developing a solid core understanding of the concepts underlying the research endeavor; 2) building an appreciation of the strengths and limitations of various designs and methods of research; 3) developing the skills to apply these methods to research problems; 4) creating an understanding of the connections between theory, method, and the advancement of knowledge; 5) becoming aware of ethical issues in research; and 6) making significant progress toward the completion of the master’s thesis proposal.
PROPOSED START: SP2018

CHANGE

OLD
MATH 527
Metric and Topological Spaces
METRC AND TOPO SPACE (3)
This course covers the classical theory of metric and topological spaces. It provides the background for several other courses in analysis, as well as a foundation in methods of algebraic topology. This course
starts by covering foundational material, so it is accessible to all first-year graduate students. The following topics are covered: metric spaces, continuous maps, compactness, connectedness, completeness, topological spaces, products, quotients, homotopy, fundamental group, and provide simple applications.

EFFECTIVE START: SP2013

NEW

MATH 527
Topology
TOPOLOGY (3)
This course provides an overview of the fundamental concepts of Geometric and Algebraic Topology and presents examples of calculations of principal topological invariants.
It starts with review of general topology and covers the following topics: fundamental group, homology theories, index theory, CW complexes, and examples of calculations.
PROPOSED START: SP2018

OLD

PHS 895A
Master of Public Health Internship
MPH INTERNSHIP (3-6: Repeatable Max: 6)
Provides Master of Public Health (MPH) degree students with hands-on, real-world experience in the practice of public health.
EFFECTIVE START: SU2012

NEW

PHS 895A
Master of Public Health Internship
MPH INTERNSHIP (3-6: Repeatable Max: 6)
Provides Master of Public Health (MPH) degree students with hands-on, real-world experience in the practice of public health.
RECOMMENDED PREPERATION: Students are required to complete 20 hours of practice-based activities prior to enrollment in this course. These activities can include community-based volunteer opportunities, PSU COM career development training events, PHASE events, or other activities as approved by the Public Health Program.
EFFECTIVE START: SP2018

OLD

PHS 895B
Advanced Field Experience
ADV FIELD EXP (1-6)
This course provides DrPH degree students with advanced hands-on, practical experience in the practice of public health.
EFFECTIVE START: FA2015

NEW

PHS 895B
Advanced Field Experience
ADV FIELD EXP (3-6)
This course provides DrPH degree students with advanced hands-on, practical experience in the practice of public health.

RECOMMENDED PREPERATION: Students are required to complete 20 hours of practice-based activities prior to enrollment in this course. These activities can include community-based volunteer opportunities, PSU COM career development training events, PHASE events, or other activities as approved by the Public Health Program.

EFFECTIVE START: SP2018

OLD

PHS 895C
Master of Public Health International Internship
MPH INTL INTERN (1-6: Repeatable Max: 6)
Provides Master of Public Health (MPH) students with real-world experience in the practice of public health in international settings.
PREREQUISITE: PHS 501
EFFECTIVE START: SU2016

NEW

PHS 895C
MPH Global Health Internship
MPH GLOBAL INTERN (1-6: Repeatable Max: 6)
Provides Master of Public Health (M.P.H.) students with real-world experience in the practice of public health in international or local settings. The Master of Public Health (M.P.H.) global health internship aims to provide M.P.H. students with hands-on experience in the practice of public health. The internship builds and reinforces public health practice skills by enabling students to apply what they have learned in the classroom to real-world public health problems and settings. As the M.P.H. is a professional degree, an internship in a real-world public health setting is critical to students’ academic and professional development, and their ability to become competent in the practice of public health. Students complete their internships at public health agencies, organizations, and/or institutions, and work on substantive projects that contribute to the mission, goals, and objectives of the sites in which they are placed. Students are matched with public health internships based on their respective academic and professional interests and goals. Students may be matched with pre-approved internships, which have been identified by the M.P.H. program leadership. Students also may seek out internship opportunities on their own. Internships that are not pre-approved must be reviewed and approved by the M.P.H. program leadership before students can begin. At each internship site, students report to an on-site Preceptor. Preceptors are identified by the M.P.H. program leadership and generally are key decision-makers at their respective agencies, organizations, or institutions. Prior to beginning the internship, students will work with the course Director to develop individualized learning objectives. These learning objectives will shape a student’s experience at the internship site and the types of projects the student will complete. The learning objectives also will provide students with a measure against which they can evaluate their efforts and the internship sites.

RECOMMENDED PREPERATION: Students are required to complete 20 hours of practice-based activities prior to enrollment in this course. These activities can include community-based volunteer opportunities, PSU COM career development training events, PHASE events, or other activities as approved by the Public Health Program.

EFFECTIVE START: SP2018
Graduate Council
Program, Option, or Minor Proposal Form

Submit 1 original, signed Graduate Council proposal form and 2 hardcopies of the graduate program proposal document, with a copy of the signed proposal form attached to each proposal copy, to the Office of the Dean of the Graduate School, 211 Kern Building, University Park. For more information about the process, see the Overview of the Graduate Council Curricular Review Process.

The Program Proposal Procedures provide guidance for the development of a graduate program proposal. If you have questions regarding the preparation of a graduate program proposal or how to complete this Graduate Council proposal form, contact the Office of the Dean of the Graduate School.

College/School: Liberal Arts
Department or Instructional Area: Anthropology

New Graduate Program, Option, or Minor: Add
Designation of new graduate program:
Classification of Instructional Programs (CIP) Code:
Designation of new graduate option:
Designation of new graduate minor:

Indicate effective semester:
First semester following approval
Second semester following approval

Existing Graduate Program Option, or Minor: Change Drop
Current designation of graduate program: Anthropology
Current designation of graduate option:
Current designation of graduate minor:
New designation of existing graduate program (if changing): N/A
New designation of existing graduate option (if changing):
New designation of existing graduate minor (if changing):

Brief description of the change (if not noted above): Change in curriculum

Indicate effective semester:
First semester following approval
Second semester following approval

Submitted by Graduate Program Head
Douglas J. Kennett
Printed name
Signature
Date: 2/20/17

Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:
Lise Nelson
Printed name
Signature
Date: 2/20/17

Approved by College/School Dean/Chancellor (or Designee):
Eric Silver
Printed name
Signature
Date: 2/22/17
Memo: Justification for changes to Anthropology Department graduate bulletin

The Department of Anthropology is one of the strongest Anthropology departments in the United States. It was ranked number one (S criteria) nationally in the most recent National Research Council (NRC) assessment, even though it is small and, importantly, unique among anthropology departments worldwide. This ranking reflects decades of national and international prominence, research leadership, and scholarly productivity, and it reflects the high quality of our graduate and undergraduate programs.

Our department focuses on a few programmatic themes with shared emphases on human adaptation, evolution, and variation in its biological and cultural dimensions. These research areas cross-cut traditional disciplinary boundaries and foster ties with scholars in allied fields throughout the university and elsewhere.

As part of its five-year Strategic Plan, in the Fall of 2016, the Anthropology Department conducted a review and revision of its graduate program requirements. These changes were designed to i) make it more likely that students could finish the degree in five years, ii) reduce the possibility of under-enrollment in graduate seminars, iii) create greater integration between the subdisciplines, iv) improve the employment prospects of our graduate students upon leaving Penn State, and v) increase recruitment and retention by streamlining and modernizing our training program. Our placement statistics were one focus of this graduate program revision. We have had 55 graduates since Spring 2003; 41 currently have academic positions, with the remainder working in government or the private sector. The average time to degree was 6.8 years. Of those in academic positions, 27 (62.8%) are currently in tenure-track positions, 6 are lecturers or adjuncts, 7 are post-docs, and 2 are in academic research positions. Of those who graduated between 2003 to 2011, 67.6% are in a tenure-track position.

The changes we made included reducing the number of required courses and eliminating subdisciplinary differences in required coursework. This is intended to facilitate more integrated and individualized training, which should improve our graduate’s job prospects. We streamlined the candidacy exam, and shifted it to the end of the first year. We also shifted the required methods and proposal writing courses to the second year to move students into research in a timely fashion, allowing them to focus more on research and publication and less on coursework, which is the key to better placement opportunities. Our graduate PhD. required courses now include 27-33 credits across all
subdisciplines, where previously we required 37 credits of specific coursework for biological anthropologists and 56 for archaeologists, all in specialized Anthropology topic seminars. This high required course load was preventing many students from finishing in a timely fashion, and reducing the effort they could devote to research and writing. Students will now have greater latitude to design their own training programs, and dual degree programs will now become easier to complete.

During this process, the Department discovered that the graduate bulletin page was not in compliance with Graduate Council requirements, and did not list any program requirements, other than a few for the Master's/IUG. All program requirements had been communicated to students solely through the department's Graduate Handbook. Furthermore, there was other information listed that was simply wrong, outdated, confusing, or completely inconsistent (i.e. one of the dual title degrees we participate in was listed, but several others were not). Because the original Bulletin entry was so completely inaccurate, only two or three sentences of the original were retained in the revision.

Rebecca Bliege Bird
Professor
Department of Anthropology
Anthropology (ANTH)

Program Home Page

DOUGLAS J. KENNETT, Head
Department of Anthropology
413 Carpenter Building
814-867-0005
814-863-1474 (fax)
anth.la.psu.edu

Degrees Conferred:

Ph.D., M.A.

Integrated B.A. in Anthropology and B.A. in Classics and Ancient Mediterranean Studies / M.A. in Anthropology
Integrated B.S. in Archaeological Science and B.A. in Classics and Ancient Mediterranean Studies / M.A. in Anthropology
Dual-Title Graduate Degree (M.A./Ph.D.) in Anthropology and Demography
Dual-Title Graduate Degree (Ph.D.) in Anthropology and Bioethics
Dual-Title Graduate Degree (M.A./Ph.D.) in Anthropology and Human Dimensions of Natural Resources and the Environment (HDNRE)

The Graduate Faculty

The Program

The Department of Anthropology at Penn State integrates social, ecological, and evolutionary approaches to understand variability in the human condition through time and across space. We offer an integrated program of graduate study at both the Ph.D. and Master’s level focusing on specialized training in human and behavioral ecology, cultural anthropology, anthropological demography, archaeology, archacometry, genetics, human evolution, and the behavioral and evolutionary biology of human and non-human primates. Students also have the option of enrolling in dual-title Ph.D. graduate programs in Demography, Human Dimensions of Natural Resources and the Environment (HNDRE), and Bioethics, and dual-title M.A. programs in Demography and HDNRE. The Department also offers two Integrated Undergraduate/Graduate (IUG) programs (B.A/M.A. and B.S./B.A/M.A.): with the Department of Classics (CAMS).

Admission Requirements

Admission requirements listed here are in addition to requirements stated in the GENERAL INFORMATION section of the Graduate Bulletin. Applicants apply for admission to the program via the Graduate School application for admission.
Entrance to the Anthropology graduate program occurs in the fall semester. Applications must be received by the department no later than December 1 for fall admission. The Department of Anthropology requires Ph.D. program applicants to submit official transcripts from all post-secondary institutions attended, Graduate Record Examinations (GRE) scores (verbal, quantitative, and analytical), a statement of purpose, a CV and at least three letters of recommendation from persons familiar with the applicant’s academic performance. A Master’s degree is not required to apply to the Ph.D. Program. The department does not admit students to the terminal Master’s degree, but does allow students to apply for a Master’s degree through admission to the IUG (Integrated Undergraduate and Graduate) program and Ph.D. degree program.

Students who are applying to the Integrated Undergraduate and Graduate (IUG) program must complete the Graduate School application for admission, and must meet all the admission requirements of the Graduate School and the Anthropology IUG graduate program. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Criteria for admission include a minimum GPA of 3.4 in their majors, strong recommendation letters from faculty, and an excellent proposal for a research project with a specific adviser who has agreed to guide the student through to the completion of the M.A. thesis or scholarly paper. In consultation with this adviser, students must prepare a plan of study appropriate to this integrated program, and must present their plan of study in person to the head of the graduate program or the appropriate committee overseeing the integrated program prior to being admitted to the program. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser as the student advances through the program.

**Master's Degree Requirements**

Requirements listed here are in addition to requirements stated in the DEGREE REQUIREMENTS section of the Graduate Bulletin.

A minimum of 30 credits at the 400, 500, 600, or 800 level is required, with at least 18 credits at the 500 and 600 level, combined. All Master’s students are required to take the three core theory seminars (ANTH 560 Ecology Evolution and Human Behavior, ANTH 571 Principles of Human Evolutionary Biology, ANTH 588 Method and Theory in Archaeology) for a total of nine credits and two core methods seminars ANTH 572, Advances in Anthropological Methods and ANTH 573 Anthropological Research Practicum, for a total of 6 credits. Students are also required to enroll in the literature review seminar (ANTH 541), for a total of 2 credits. A Master’s thesis, including 6 credits of ANTH 600 Thesis Research is optional. This thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School. Students in the non-thesis track must write a satisfactory scholarly paper, while enrolled in ANTH 596. All entering graduate students are expected to complete online training in Scholarship and Research Integrity (SARI), also referred to as Responsible Conduct of
Research (RCR), by no later than October 1 of their first semester in residence.

**Doctoral Degree Requirements**

Requirements listed here are in addition to requirements stated in the DEGREE REQUIREMENTS section of the Graduate Bulletin.

The doctoral degree in Anthropology requires a minimum of 30 credits, 27 of which are required coursework. All first-year Ph.D. students are required to register for 9-12 credits per semester and complete 15 credits of course work, including the three core theory seminars (ANTH 560, ANTH 571, ANTH 588) and two research method seminars, ANTH 572 and ANTH 573. The core method and theory courses will serve as the basis for the Ph.D. candidacy exam, which will take place at the end of the first year. In the fall of the second year, all students in the Ph.D. program who have advanced to candidacy should enroll for a total of 9-12 credits per semester, including ANTH 509. ANTH 508, Visualizing Anthropological Data, is required for all Ph.D. students and may be taken at any point in the first two years. Students without suitable preparation in statistics may also be required to take a course at the 400 or 500 level at the advisor’s discretion. A student’s doctoral committee can require additional course work depending on the student’s background and research plans. All Ph.D. students are required to enroll in a one-unit literature review seminar (ANTH 541), for one credit each semester during the first six semesters of study. All entering graduate students are expected to complete online training in Scholarship and Research Integrity (SARI), also referred to as Responsible Conduct of Research (RCR), by no later than October 1 of their first semester in residence. A student’s doctoral committee can require reading knowledge and/or demonstrated working knowledge of a foreign language, specialized training in linguistics, or training in computer programming languages, depending on the student’s research interests. For the Ph.D. degree, students must conduct significant original research that demonstrates the student’s mastery of the field. The Ph.D. requirements include successful completion of coursework as stipulated by the department and doctoral committee, passing the candidacy exam, preparing a dissertation proposal, successfully passing the comprehensive exam/dissertation proposal defense, and writing and defending the subsequent dissertation. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School, and the student must pass a final oral examination (the dissertation defense).

**Integrated Undergraduate and Graduate (IUG) Degree Requirements**

The Department of Anthropology offers integrated undergraduate-graduate (IUG) degree programs (B.A./B.A./M.A. or B.A./B.S./M.A.) designed to allow academically superior students to obtain a either B.A. degree in Anthropology or a B.S. degree in Archaeological Science, a B.A. degree in Classics and Ancient Mediterranean Studies (CAMs), and an M.A. degree in Anthropology in five years of study.

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the B.A. in Anthropology, B.A. in Classics and Ancient Mediterranean Studies, and B.S. in
Archaeological Science are listed in the Undergraduate Bulletin. Degree requirements for the M.A. degree are listed below. Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Credits associated with the culminating experience for the graduate degree cannot be double-counted. The courses that are eligible to double count for both degrees are: ANTH 560, ANTH 571, ANTH 572, ANTH 573, ANTH 588.

Students must sequence their courses so all undergraduate degree requirements are fulfilled before taking courses to count towards the graduate degree. If students accepted into the IUG program are unable to complete the M.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Dual-Title Graduate Degree (M.A./Ph.D.) in Anthropology and Demography

The Demography interdisciplinary program is designed to give students in-depth knowledge of the demographic dimensions of anthropological research, including studies of present populations as well as those of the past.

Admissions Requirements

Students must apply and be admitted to the graduate program in Anthropology and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the Demography dual-title program. Refer to the Admission Requirements section of the Demography Bulletin page. Doctoral students must be admitted into the dual-title degree program in Demography prior to obtaining candidacy in their primary graduate program.

Degree Requirements

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Anthropology, listed above. In addition, students must complete the degree requirements for the dual-title in Demography, listed on the Demography Bulletin page.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Anthropology and must include at least one Graduate Faculty member from the Demography program. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. There will be a single candidacy examination, containing elements of both Anthropology and Demography. Dual-title graduate degree students may require an additional semester to fulfill requirements for both areas of study and, therefore, the candidacy examination may be delayed one semester beyond the normal period allowable.

In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of an Anthropology and Demography dual-title Ph.D. student must include at least
one member of the Demography Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the doctoral committee is not also a member of the Graduate Faculty in Demography, the member of the committee representing Demography must be appointed as co-chair. The Demography representative on the student’s doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and education in Anthropology and Demography. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

**Dual-Title Graduate Degree (M.A./Ph.D.) in Anthropology and Human Dimensions of Natural Resources and the Environment (HDNRE)**

The HDNRE program, which involves four colleges including the College of the Liberal Arts, is oriented toward research that further our understanding of the human use of natural resources, a pressing concern for all of us in the twenty-first century. Topics of special concern for anthropologists are the (very) long-term impact of humans on natural settings, and the ways people have adapted to those changes in their surroundings.

**Admissions Requirements**

Students must apply and be admitted to the graduate program in Anthropology and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the HDNRE dual-title program. Refer to the Admission Requirements section of the HDNRE Bulletin page. Doctoral students must be admitted into the dual-title degree program in HDNRE prior to obtaining candidacy in their primary graduate program.

**Degree Requirements**

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Anthropology, listed above. In addition, students must complete the degree requirements for the dual-title in HDNRE, listed on the HDNRE Bulletin page.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Anthropology and must include at least one Graduate Faculty member from the HDNRE program. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. There will be a single candidacy examination, containing elements of both Anthropology and HDNRE. Dual-title graduate degree students may require an additional semester to fulfill requirements for both areas of study and, therefore, the candidacy examination may be delayed one semester beyond the normal period allowable.
In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of an Anthropology and HDNRE dual-title Ph.D. student must include at least one member of the HDNRE Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the doctoral committee is not also a member of the Graduate Faculty in HDNRE, the member of the committee representing HDNRE must be appointed as co-chair. The HDNRE representative on the student’s doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and education in Anthropology and HDNRE. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

Dual-Title Ph.D. in Anthropology and Bioethics

The Bioethics program provides anthropology students with an opportunity to develop their knowledge of the social and ethical implications of their research. This combination – solid research experience and an intimate knowledge of the ethical dimensions of that work – is increasingly important in the workplace, and broadens the possibilities of employment beyond traditional anthropology positions.

Admissions Requirements

Students must apply and be admitted to the graduate program in Anthropology and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the Bioethics dual-title program. Refer to the Admission Requirements section of the Bioethics Bulletin page. Doctoral students must be admitted into the dual-title degree program in Bioethics prior to obtaining candidacy in their primary graduate program.

Degree Requirements

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Anthropology, listed above. In addition, students must complete the degree requirements for the dual-title in Bioethics, listed on the Bioethics Bulletin page.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Anthropology and must include at least one Graduate Faculty member from the Bioethics program. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. There will be a single candidacy examination,
containing elements of both Anthropology and Bioethics. Dual-title graduate degree students may require an additional semester to fulfill requirements for both areas of study and, therefore, the candidacy examination may be delayed one semester beyond the normal period allowable.

In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of an Anthropology and Bioethics dual-title Ph.D. student must include at least one member of the Bioethics Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the doctoral committee is not also a member of the Graduate Faculty in Bioethics, the member of the committee representing Bioethics must be appointed as co-chair. The Bioethics representative on the student’s doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and education in Anthropology and Bioethics. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Student Aid section of the Graduate Bulletin. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin."

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.”

ANTHROPOLOGY (ANTH) course list

Last Revised by the Department: Spring Semester 2017

Blue Sheet Item #: 42-01-122; 42-01-123
# Graduate Council
## Program, Option, or Minor Proposal Form

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**College/School:** College of Medicine  
**Department or Instructional Area:** Neuroscience Graduate Program

### New Graduate Program, Option, or Minor:

<table>
<thead>
<tr>
<th>Add</th>
</tr>
</thead>
</table>

**Designation of new graduate program:**

Classification of Instructional Programs (CIP) Code: __________

**Designation of new graduate option:**

**Designation of new graduate minor:**

Indicate effective semester:

- First semester following approval
- Second semester following approval

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### Existing Graduate Program Option, or Minor:

<table>
<thead>
<tr>
<th>Change</th>
<th>Drop</th>
</tr>
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</table>

**Current designation of graduate program:** Neuroscience Graduate Program

**Current designation of graduate option:**

**Current designation of graduate minor:**

**New designation of existing graduate program (if changing):** Neuroscience - Translational Science Dual-Title Program

**New designation of existing graduate option (if changing):**

**New designation of existing graduate minor (if changing):**

**Brief description of the change (if not noted above):** Adoption of Clinical and Translational Sciences Dual-Title Program

Indicate effective semester:

- First semester following approval
- Second semester following approval

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**Submitted by Graduate Program Head**

Colin Barstelle  
Printed name  
Signature  
Date: 4/10/17

**Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:**

Gail Matters  
Printed name  
Signature  
Date: 4/10/17

**Approved by College/School Dean/Chancellor (or Designee):**

Charles Lang  
Printed name  
Signature  
Date: 4/10/17
Neuroscience Graduate Program Change Proposal:

Adoption of the dual-title graduate degree program in Clinical and Translational Sciences

Contents

1. Objectives of the Program Change p. 2
2. Justification for the Program Change p. 2
3. Recruitment, Exams, Curriculum, Mentoring p. 3
4. Table I – Clinical and Translational Sciences Elective Emphasis Areas p. 5
5. Bulletin Listing p. 8
6. Appendix 1: Table II – Typical Coursework Schedule for Ph.D. Degree – Years 1 and 2 p. 15
1. Objectives of Program Change

The objective of this document is to propose a Dual-Title PhD Degree in Neuroscience and Clinical and Translational Sciences. A dual-title PhD in Neuroscience and Clinical and Translational Science will expand the educational experience of students training in neuroscience to include the education and training through a unique curriculum and research focus with the objective of preparing students for career paths that involve clinical trials or clinical research programs. The Neuroscience component of the dual-title provides pre-doctoral students curricular training in the broad spectrum of neuroscience with opportunities to focus on normal and abnormal human health and disease. The Clinical and Translational Sciences component of the dual-title emphasizes knowledge and research related to epidemiological and behavioral outcomes and health services research that transitions scientific findings from the laboratory to the clinical setting to best practices in the community. Pairing of the two training experiences in the Dual-Title PhD in Neuroscience and Clinical and Translational Sciences, yields opportunities for interdisciplinary scholarship transitioning from basic science to clinical science.

2. Justification for Program Change

The existing Graduate Certificate Programs in Clinical Research and in Translational Research offered through the College of Medicine provide limited exposure to the field of Clinical and Translational Sciences (CTS). However, they cannot offer the same integrated training and research experiences offered by a dual-title PhD degree. The Dual-Title PhD in Neuroscience and Clinical and Translational Sciences is part of a national effort, led by the NIH Roadmap, to change the culture of health-related research by reducing program compartmentalization and encouraging interdisciplinary team-based science.

Interdisciplinary training in CTS prepares students for successful careers in the pharmaceutical industry (ranging from drug design to clinical trials), community and public health, as well as more traditional academic and clinical venues. The Neuroscience Graduate Program considers adoption of the Dual-Title PhD in Clinical and Translational Sciences to be responsive to the recent comments by NIH and others outlining the importance for graduate degree programs to embrace the need for innovation in workforce development.

The expected benefits of the dual-title graduate degree include:
- Value-added training and scholarship for current students rather than competition between graduate programs for an applicant pool;
- Addition of novel course work and training not offered in an existing (primary) graduate degree program;
- Focused coursework that ensures specialized training;
- Integration of clinical/translational research training into thesis and dissertation work (e.g. candidacy, comprehensives, research);
- Enhanced methodological/analytical skills and training;
- Expanded employment and career opportunities within the health sciences arena.

This dual-title degree will encourage interdisciplinary scholarly work at the interface between many domains by focusing on human health. Using practicums, course work and research, the
proposed program of study is designed to extend students’ knowledge beyond their primary area of study to foster a greater understanding and competence in clinical and health-related research. Ultimately, this approach should enable a new breed of scientists capable of targeting their research programs to address the unmet preventative, therapeutic and diagnostic needs of the future.

3. Recruitment, Exams, Curriculum, Mentoring

Recruitment of Dual-Title Students

Potential Dual-Title trainees will express an interest in the Dual-Title Degree as early as during the recruitment process for the Neuroscience Graduate Program and may apply for the dual-title Ph.D. in Neuroscience and Clinical and Translational Sciences following admission to the Graduate School and prior to taking the candidacy exam in Neuroscience, no later than at the end of the 4th semester of graduate study in Neuroscience. Students interested in the Dual-Title Degree will be considered for admission to the Clinical and Translational Sciences Program by a committee consisting of the Clinical and Translational Sciences Program co-directors and faculty affiliated with the Clinical and Translational Sciences Dual-Title Program.

Candidacy Exam for Dual-Title Students

Typically Neuroscience graduate students take the candidacy exam at the end of the first year of graduate training. Neuroscience graduate students accepted to the Clinical and Translational Sciences Dual-Title Program will take the candidacy exam by the end of the fourth semester of graduate training: 1) to allow exposure to the Clinical and Translational Sciences Curriculum in the Spring semester of the first year, which will better prepare the students for the integrated content of the dual-title candidacy exam; and 2) to allow enough time to identify and assure commitment of an appropriate dissertation mentor who embraces the dual-title program of the student. During the candidacy process, the student will also be assessed for candidacy to the dual-title program, and at least one member of the candidacy committee must come from the dual-title program. Faculty members who hold appointments in both programs may serve in a combined role.

Doctoral Committee for Dual-Title Candidates

In accordance with Graduate Council requirements, the doctoral committee shall contain at least four members. In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of a Neuroscience and CTS dual-title Ph.D. student must include at least one member of the CTS Graduate Faculty. At least one regular member of the doctoral committee must represent a field outside the candidate’s major field of study in order to provide a broader range of disciplinary perspectives and expertise. This committee member is referred to as the “Outside Field Member.” In cases where the candidate is also pursuing a dual-title field of study, the dual-title representative to the committee may serve as the Outside Field Member.

Additionally, in order to avoid potential conflicts of interest, the primary appointment of at least one regular member of the doctoral committee must be in an administrative unit that is outside the unit in which the dissertation adviser’s primary appointment is held (i.e., the adviser’s administrative home; in the case of tenure-line faculty, this is the individual’s tenure
home). This committee member is referred to as the “Outside Unit Member.” In the case of co-advisers, the Outside Unit Member must be from outside the administrative home(s) of both co-advisers. In some cases, an individual may have a primary appointment outside the administrative home of the student’s dissertation adviser and also represent a field outside the student’s major field of study; in such cases, the same individual may serve as both the Outside Field Member and the Outside Unit Member.

The committee chair will be a member of the Graduate Faculty in the primary area of study or the dual-title program. Faculty members who hold appointments in both the primary area of study and the CTS program may serve in a combined role.

If the committee chair does not serve in this combined role, the faculty member representing the CTS program must be designated co-chair of the committee. The CTS representative(s) will be expected to assist in constructing and evaluating comprehensive examination questions that cover the secondary area of study.

Curriculum for Dual-Title Students and Reciprocity in Curricular Requirements

The Clinical and Translational Sciences Dual-Title PhD curriculum has four general features:

- Basic and clinical science didactic coursework in each of the following areas:
  - Statistics (3 credits)
  - Epidemiology (3 credits)
  - Bioinformatics (3 credits)
  - Experimental design and interpretation (3 credits)
  - The regulatory environment (3 credits)
  - Scientific communication (3 credits)

- Co-mentoring by basic and clinical scientists during the student’s dissertation research

- Structured experiences in health care and clinical research

- Exposure to the opportunities afforded by focusing basic sciences, clinical sciences and community engagement on both treatment and prevention to enhance human health.

Common to the Neuroscience and Clinical and Translational Sciences curricula are mandatory Scholarship and Research Integrity (SARI) and Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC) training (as appropriate). Specific to the Clinical and Translational Sciences curriculum are two semesters of the Clinical and Translational Sciences Seminar (1 credit each semester), and 6 credits of clinical rotation or practicum as approved by the Directors of the Clinical and Translational Sciences Graduate Program (CTS 595 Internship or BMS 571 Graduate Clinical Rotation). BMS 571 (up to 3 credits) is an approved elective in the Biomedical Sciences curriculum. Additional requirements for the dual-title PhD in Clinical and Translational Sciences include 18 credits from the list of electives presented in Table I, with the number of credits from specific areas indicated, e.g., 3 credits of statistics. Recommended and/or required courses for the Neuroscience Program that are approved as electives for Clinical and Translational Sciences are indicated in red.
As seen below, reciprocity between the Dual-Title PhD Program and the Neuroscience Graduate Program allows for up to 7 of the credits required for the Clinical and Translational Science degree to be met simultaneously by curricular requirements for the Neuroscience doctoral degree (NEURO 530 and six elective credits). Thus Neuroscience students must select additional credits from the classes listed below to complete the Dual-Title Program in Clinical and Translational Science. The additional coursework should be reasonably achieved by the end of the fifth semester of the graduate program.

4. **Table I**: Clinical and Translational Sciences Elective Emphasis Areas

<table>
<thead>
<tr>
<th>Statistics (3 credits)</th>
<th>Epidemiology (3 credits)</th>
<th>Bioinformatics (3 credits)</th>
<th>Experimental design and interpretation (3 credits)</th>
<th>The regulatory environment (3 credits)</th>
<th>Scientific communication (3 credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDFS 516 (3) Methods of research in human development</td>
<td>BBH/HPA 440 (3) Principles of epidemiology</td>
<td>HPA 528 (3) Health data analysis for research</td>
<td>BBH 502 (PSY 502) (3) Health: biobehavioral perspectives</td>
<td>BBH 551 (3) World health promotion</td>
<td>BMS 504 (1) Art of scientific communication I</td>
</tr>
<tr>
<td>HDFS 518 (1) Applied statistics laboratory</td>
<td>HDFS 527 (3) Social epidemiology</td>
<td>MCIBS 551 (BMMB 551) (3) Genomics</td>
<td>BB H 505 (3) Behavioral health research strategies</td>
<td>BIOET 501 (3) Perspectives and methods in bioethics</td>
<td>BMS 505 (1) Art of scientific communication II</td>
</tr>
<tr>
<td>HDFS 519 (3) Methods of statistical analysis in human development</td>
<td>HPA 540 (3) Epidemiological applications in health services research</td>
<td>PHS 516 (3) Statistical Genetics</td>
<td>BMS 581 (3) Molecular and translational approaches to human disease</td>
<td>BIOET 502 (3) Perspectives in Macro- bioethics</td>
<td>BMS 571 (1) Graduate Clinical Rotation</td>
</tr>
<tr>
<td>H P A 564 (3) Research methods in health services research</td>
<td>PHS 550 (3) Principles of epidemiology</td>
<td></td>
<td>HDFS 506 (3) Design and evaluation of prevention and health promotion programs across the lifespan</td>
<td>BIOET 503 (PHIL 573) (3) Ethics and the responsible conduct of biomedical research</td>
<td></td>
</tr>
<tr>
<td>H P A 566 (3) Advanced methods in health services research</td>
<td>PHS 551 (3) Advanced epidemiological methods</td>
<td></td>
<td>HDFS 508 (1-6) Best practices in preventative intervention</td>
<td>BMS 591 (1) Biomedical research ethics</td>
<td></td>
</tr>
<tr>
<td>PHS 520 (3) Principles of biostatistics</td>
<td>PHS 552 (3) Molecular epidemiology of chronic disease</td>
<td></td>
<td>HPA 561 (3) Introduction to research design in health services research</td>
<td>MCIBS 591 (1) Ethics in the life sciences</td>
<td></td>
</tr>
<tr>
<td>PHS 521 (3) Applied biostatistics</td>
<td>PHS 553 (3) Infectious disease epidemiology</td>
<td>PHARM 520 (2) Principles of Drug Action</td>
<td></td>
<td>HLTHL 961 (3) Bioethics and public health law</td>
<td></td>
</tr>
<tr>
<td>PHS 522 (3) Multivariate biostatistics</td>
<td>STAT 507 (3) Epidemiologic research methods</td>
<td>PHS 504 (3) Behavioral health intervention strategies</td>
<td></td>
<td>HLTHL 971 (3) Law and medicine</td>
<td></td>
</tr>
<tr>
<td>PHS 523 (3) Multivariate analysis</td>
<td>VBSC 444 (3) Epidemiology of infectious disease</td>
<td>PHS 505 (3) Public Health Program Planning and Evaluation</td>
<td></td>
<td>HPA 520 (3) Intro to health service organizations and delivery</td>
<td></td>
</tr>
</tbody>
</table>
Comprehensive Exam for Dual-Title Candidates

After completion of required coursework, candidates for the dual-title doctoral degree must pass a comprehensive examination that integrates both fields of study. The dual-title faculty representative on the student’s doctoral committee will participate in the writing and evaluation of the comprehensive examination. The exam will require the student to demonstrate an understanding of the methods of translational sciences and an ability to apply them to problems in the student’s major field of study. When appropriate, the student will be expected to demonstrate a working knowledge of methods to evaluate and compare the outcomes of his/her research to related approaches already in existence.

Dissertation and Final Oral Exam

A dissertation in the primary field with a substantial component of clinical and translational research is required of all students in the dual-title program. The topic of the dissertation will be approved in advance by the student’s doctoral committee. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School.
Impact of Proposed Program Change for Departments Affected

The proposed program will minimally impact current course offerings, faculty loads and faculty advising duties at the College of Medicine.

Accreditation

There is no accrediting body for the proposed Dual-title in Neuroscience and Clinical and Translational Sciences.
Neuroscience (NEURS)

Program Home Page

COLIN BARNSTABLE, Co-Director of Neuroscience Program
College of Medicine, University Hospital
Penn State Milton S. Hershey Medical Center
Hershey, PA 17033
717-531-1045
Neuro-grad-hmc@psu.edu

KEVIN ALLOWAY, Co-Director of Neuroscience Program
W316 Millenium Science Complex
University Park, PA 16802
814-867-6413
kda1@psu.edu

Degrees Conferred:

Ph.D., M.S.
Dual-title Ph.D. in Neuroscience and Clinical and Translational Sciences

M.D./Ph.D.

The Graduate Faculty

The Program

The Neuroscience (NEURS) Graduate Program provides students curricular training with a broad focus on neuroscience, and the opportunity for concentrated research in a variety of disciplinary approaches to neuroscience such as biochemistry, cell biology, embryology, genetics, immunology, neuroscience, pharmacology, physiology, structural biology, and virology. Students receive rigorous training that provides the skills necessary to be leaders in biomedical research and other endeavors that benefit from a rigorous scientific background, including education, law, journalism, and public policy.

The first-year Fall curriculum provides 6 credits of Biomedical Sciences that encompasses 6 modules providing underlying principles of basic cellular processes of medical sciences as well
as an introduction to Cellular and Molecular Neuroscience (3 credits). In addition, the Fall curriculum includes a one-credit Colloquium which introduces the student to professionalism, scientific communication, and addresses manuscript evaluation and writing, as well as scientific methodology and techniques that will be discussed in subsequent coursework. The first Spring curriculum includes one 3-credit course focusing on neuroanatomical studies (NEURO 511) followed by a systems neuroscience course (NEURO 521). During the first year, students complete three research rotations that expose them to the wide range of research interests of The Pennsylvania State University graduate faculty from both basic and clinical science departments at the College of Medicine in Hershey. These rotations serve to inform the students with regard to choosing a thesis or dissertation adviser and forming a master’s or doctoral committee. In addition, students are advised to take ethics, statistics and electives. The doctoral students also complete their candidacy examination which entails an oral presentation and a written examination on anatomical coursework. Successful completion of the Program results in conferral of the master’s or doctoral degree in Neuroscience.

The Neuroscience Graduate Program is an interdepartmental program that engages faculty from multiple basic science and clinical science departments. This broad-reaching Program provides students a wide ranging understanding of multiple disciplines with specific expertise in a chosen area, and encourages interdisciplinary research that is the hallmark of biomedical sciences in the 21st century.

**Admission Requirements**

Admission requirements listed here are in addition to requirements stated in the [GENERAL INFORMATION section of the Graduate Bulletin](https://www.psu.edu). Applicants apply for admission to the program via the [Graduate School application for admission](https://www.psu.edu).

**Ph.D., M.S.**

Prospective applicants should have a bachelor's degree in a biological, physical, or behavioral science and are expected to have taken undergraduate courses in biology, chemistry, physics, and mathematics. Candidates are expected to have a 3.0 (B) grade-point average or better. Neuroscience courses are desirable but not essential and research experience is an advantage. The General Test of the Graduate Record Examinations (GRE), or a comparable substitute examination accepted by the Neuroscience graduate program, is required for all applicants.

A complete application includes: completed online application with personal statement of purpose; GRE scores; [official transcripts from all post-secondary institutions attended](https://www.psu.edu); three letters of recommendation; and TOEFL scores (if applicable).

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. Consult the English Proficiency section of the [Graduate Bulletin Application and Admission Procedures page](https://www.psu.edu) for more information.

The application deadline is December 15 for admission in the following fall.
Qualified applicants generally will be requested to visit the College of Medicine in Hershey, PA for an interview. Admission is based on evaluation of the undergraduate transcript, GRE scores, personal statement of purpose, letters of recommendation, and performance at the interview.

**Dual-Title Ph.D. Degree in Neuroscience and Clinical and Translational Sciences**

Potential dual-title students can express an interest in the CTS dual-title as early as during the recruitment process for the Neuroscience Graduate Program. Students must apply and be admitted to the graduate program in Neuroscience and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the CTS dual-title program. Refer to the Admission Requirements section of the [CTS Bulletin page](#). Doctoral students must be admitted into the dual-title degree program in CTS prior to obtaining candidacy in Neuroscience.

Students interested in the Dual-Title Degree will be considered for admission to the Clinical and Translational Sciences Program by a committee consisting of the Clinical and Translational Sciences Program co-directors and faculty affiliated with the Clinical and Translational Sciences Dual-Title Program. To apply, the student must submit the following documentation to the Clinical and Translational Sciences Dual-title Program:

1. A statement of interest, including the applicant’s reasons for pursuing a career that includes clinical/translational science.
2. A letter from the applicant’s research adviser which endorses the applicant’s participation in the Clinical and Translational Sciences Dual-title Program.
3. A letter of support from the head of Neuroscience. If the applicant has not yet selected a research adviser, the program head’s letter should describe the program’s support of the applicant’s desire to incorporate clinical/translational research in the applicant’s training plans.
4. A description of the applicant’s academic performance to date.

**M.D./Ph.D.**

Applicants to the joint M.D./Ph.D. degree program must apply and be admitted to both the Neuroscience graduate program and the College of Medicine.

Students interested in simultaneously pursuing an M.D. and Ph.D. degree must apply to the College of Medicine M.D. program using the national American Medical College Application Service (AMCAS) application system and indicate their intent to pursue the joint degree program. Admissions requirements and applications for admission for Penn State College of Medicine are available at the [M.D. Program](#) section of the Penn State College of Medicine website. The College of Medicine M.D./Ph.D. Admissions Committee reviews applications and evaluates candidates for acceptance into both the M.D. and Ph.D. program. Students not accepted into the joint degree program can be referred to either the M.D. or Ph.D. program, depending on their qualifications and interests.

After the review committee has accepted an applicant to the joint degree program, s/he must [apply and be admitted to the Graduate School](#) for admission to the graduate program. The
general admission requirements for the Ph.D. degree are listed above. Additional requirements for the joint degree are listed below.

- **Academic Achievement.** Applicants to our program generally have very strong grades and MCAT scores. In recent years, successful applicants have an average GPA of 3.75 and total MCAT scores of >85 percentile. Applicants are not required to take the GREs.

- **Research Experience.** We are especially interested in students with a strong and sustained background in research. Students who have spent 1-2 years after graduation conducting research are strongly encouraged to apply. Alternatively, in-depth research experience as an undergraduate can suffice.

- **Recommendations.** We are especially interested in receiving letters of recommendation from faculty with whom you conducted research and who can comment on your passion and potential for research.

- **Goals.** Applicants must be able to clearly articulate the reasons for pursuing the joint degree.

- **International Students.** All qualified students are eligible to apply regardless of citizenship.

### Degree Requirements

#### Ph.D. degree in Neuroscience

Requirements listed here are in addition to requirements stated in the [DEGREE REQUIREMENTS](#) section of the *Graduate Bulletin*.

A minimum of 32 credits is required for the Ph.D. degree: 15 credits of core requirements, 11 credits of program requirements, and 6 credits of electives. The 15 credits of core requirements are: BMS 502 (3 cr.), BMS 503 (3 cr.), NEURO 511 (3 cr.), NEURO 520 (3 cr.), and NEURO 521 (3 cr.). The 11 credits of program requirements are: PHS 520 (3 cr.), NEURO 522 (2 cr.), NEURO 523 (2 cr.), NEURO 530 (1 cr.), NEURO 590 (2 cr.), and BMS 591 (1 cr.). In addition, Ph.D. students are required to complete 1 credit of Supervised Experience in College Teaching (NEURO 602); however, this 1 credit cannot be counted towards the minimum 32 credits required. A minimum of 6 elective credits is required. A student’s doctoral committee can require additional course work depending on the student’s background and research plans.

Official entrance into the Ph.D. program occurs upon successful completion of the candidacy examination. Ph.D. degree requirements include successful completion of the following: approved graduate course work, English Competence requirements, a comprehensive examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral candidates must write a dissertation that is accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

#### M.S. degree in Neuroscience
Requirements listed here are in addition to requirements stated in the DEGREE REQUIREMENTS section of the Graduate Bulletin.

A minimum of 30 credits at the 400, 500, 600, or 800 level is required for the M.S., with at least 18 credits at the 500 and 600 level, combined. There are 15 credits required in the following core courses: NEURO 511 (3 cr.), NEURO 520 (3 cr.), NEURO 521 (3 cr.), NEURO 522 (2 cr.), NEURO 523 (2 cr.), NEURO 530 (1 cr.), and BMS 591 (1 cr.). A thesis is required, and a minimum of six (6) thesis research credits (SUBJ 600 or 610) must be taken in Neuroscience. The remaining elective credits may be chosen from a list of approved electives maintained by the program office. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

**Dual-Title Ph.D. in Neuroscience and CTS Degree Requirements**

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Neuroscience, listed above. In addition, students must complete the degree requirements for the dual-title in CTS, listed on the CTS Bulletin page. Up to 7 credits of course work may be used to satisfy both Neuroscience and CTS degree requirements. In addition, a student may request to double count additional credits up to a maximum of 12. An increase in double-counted credits will be determined by the CTS Program on a case-by-case basis.

Neuroscience graduate students accepted to the Clinical and Translational Sciences Dual-Title Program will take the candidacy exam by the end of the fourth semester of the graduate program: 1) to allow exposure to the Clinical and Translational Sciences Curriculum in the Spring semester of the first year and Fall semester of the second year, which will prepare the students for the integrated content of the dual-title candidacy exam, and 2) to allow sufficient time to identify and assure commitment of an appropriate dissertation adviser who embraces the dual-title program of the student. During the candidacy examination, the student will also be assessed for candidacy to the dual-title program, and at least one member of the candidacy committee must come from the dual-title program. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role.

In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of a Neuroscience and Clinical and Translational Sciences dual-title doctoral degree candidate must include at least one member of the Clinical and Translational Sciences Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the doctoral committee is not also a member of the Graduate Faculty in CTS, the member of the committee representing CTS must be appointed as co-chair. The CTS representative on the student’s doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students enrolled in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and expertise in both Neuroscience and Clinical and Translational Sciences. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be
accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

**M.D./Ph.D. Degree Requirements**

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the M.D. program are listed on the [M.D. Program](#) section of the Penn State College of Medicine website. Degree requirements for the Ph.D. degree are listed above.

During the first two years of medical school, the student conducts at least three research rotations. In addition, students are required to take BMS 506A and 506B during the M1 (Spring) and M2 (Fall), as well as either a 1 credit course in genetics or immunology. After successful completion of the first two years of medical school the candidate joins their dissertation lab in the Neuroscience Graduate Program.

During the summer after the second year of medical school M.D./Ph.D. students take Step 1 of the United States Medical Licensing Examination (USMLE), which serves in lieu of the knowledge-based portion of the Candidacy Examination for the Neuroscience program.

The doctoral committee of an M.D./Ph.D. student in the Neuroscience program is formed upon entry into the dissertation laboratory. In addition to the [general Graduate Council requirements for doctoral committees](#), the committee must include at least two members of the Neuroscience program Graduate Faculty and one M.D./Ph.D. steering committee member.

In addition to taking the required courses NEURO 590 Colloquium (2 cr.), BMS 591, Ethics in the Life Sciences (1 cr.), and PHS 520 Introduction to Biostatistics (3 cr.), students are required to take the core neuroscience courses NEURO 521 Systems Neuroscience (3 cr.), NEURO 522 Seminar in Neuroscience I (2 cr.), NEURO 523 Seminar in Neuroscience II (2 cr.), and NEURO 530 Professional Development (1 cr.). A minimum of 4 elective credits is required. Other elective courses are selected in consultation with the student’s dissertation adviser and doctoral committee.

The Neuroscience program will accept passing grades in the medical school courses SPM 711 Scientific Principles of Medicine (11 cr.) and NBS 723 Neural and Behavioral Science (3 cr.) in lieu of 12 required credits for the Neuroscience Ph.D. The 12 required credits are BMS 501 (3 cr.), BMS 502 (3 cr.), NEURO 520 (3 cr.), and NEURO 511 (3 cr.). M.D./Ph.D. candidates are not required to take NEURO 602 Supervised Experience in College Teaching (1 cr.).

The M.D./Ph.D. candidate prepares a written comprehensive examination in the format of a grant application and gives an oral presentation of this proposal to their doctoral committee.

M.D./Ph.D. candidates are required to have at least one paper accepted for publication in a major peer-reviewed scientific journal prior to the final oral examination, and this must be accepted before they return to the third year of medical school. A student may petition to waive this requirement due to extenuating circumstances (e.g., adviser relocation, abnormal issues with publication process). All waivers must be approved by the Vice Dean for Research and Graduate Studies of the College of Medicine. A dissertation must be prepared and defended by each M.D./Ph.D. candidate prior to returning to the M3 year of medical school. The dissertation must
be accepted by the doctoral committee, the head of the graduate program, and the Graduate
School, and the student must pass the final oral examination (the dissertation defense).
If a student decides not to return to medical school, or for some other reason is not able to
complete the last two years of medical school, but they have successfully completed their Ph.D.
dissertation and final oral examination and met all other degree requirements of the
Neuroscience program, they will be able to complete the Ph.D.. The latter will be conferred
after the student notifies the program that she/he wishes to withdraw from the M.D. program
and completes all requirements for conferral of the graduate degree.

Student Aid

Graduate assistantships and other forms of student aid are described in the STUDENT AID
section of the Graduate Bulletin. Students on graduate assistantships must adhere to the
course load limits set forth in the Graduate Bulletin. All support is continuous for the first year
from the Neuroscience program. Support in years two and above, when the student is
conducting dissertation research, must be acquired from either the basic science department in
which the candidate elects to pursue his/her minor or from funds available from the
dissertation adviser. These funds must be secured by the student in conjunction with his/her
adviser.

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate
courses numbered between 400 and 499 may be used to meet some graduate degree
requirements when taken by graduate students. Courses below the 400 level may not. A
graduate student may register for or audit these courses in order to make up deficiencies or to
fill in gaps in previous education but not to meet requirements for an advanced degree.

NEUROSCIENCE (NEURO) course list
1. Table II: Typical Coursework Schedule for Ph.D. Degree in Neuroscience: Years 1 and 2

<table>
<thead>
<tr>
<th>CORE REQUIREMENTS FOR ALL STUDENTS</th>
<th>Neuro PROGRAM TRACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Credits</td>
<td>14 Core Requirement Credits</td>
</tr>
<tr>
<td></td>
<td>11 Program Required Credits</td>
</tr>
<tr>
<td></td>
<td>6 Elective Credits¹</td>
</tr>
</tbody>
</table>

**Fall Year 1 (13 credits)**

- Core Requirement (3) BMS 502 (3)
- Core Requirement (3) BMS 503 (3)
- Core Requirement (3) Neuro 520 (3)
- Program Requirement Neuro 590 (1)

**Spring Year 1 (2 – 9 credits)**

- Core Requirement (2) NEURO 511 Neuroanatomy (3)
- Core Requirement (3) Neuro 521 (3)
- Program Requirement Neuro 590 (1)
- Program Requirement Neuro 522 or 523 (2)
- Program Requirement Neuro 596 Research rotations (1)

**Neuroscience Graduate Program Candidacy Examination - Enter laboratory for dissertation research**

**Fall Year 2 (8 credits)**

- Program Requirement Neuro 530 (1)
- Program Elective Electives (1-3)

**Spring Year 2 (1-3 credits)**

- Program Elective Electives (1-3)
- Program Requirement Neuro 602 Supervised teaching (1)
- Program Requirement Neuro 522 or 523 (2)

**Comprehensive Exam**

¹ The minimum number of elective credits required is shown. In consultation with their Dissertation Adviser, students may take additional credits. One potential timing of elective credits is indicated by “PROGRAM ELECTIVE”. Numbers in parentheses indicate credit hours for each course.
**Graduate Council**  
**Program, Option, or Minor Proposal Form**

Submit 1 original, signed Graduate Council proposal form and 2 hardcopies of the graduate program proposal document, with a copy of the signed proposal form attached to each proposal copy, to the Office of the Dean of the Graduate School, 211 Kern Building, University Park. For more information about the process, see the Overview of the Graduate Council Curricular Review Process.

The [Program Proposal Procedures](#) provide guidance for the development of a graduate program proposal. If you have questions regarding the preparation of a graduate program proposal or how to complete this Graduate Council proposal form, contact the Office of the Dean of the Graduate School.

<table>
<thead>
<tr>
<th>College/School:</th>
<th>College of Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department or Instructional Area:</td>
<td>Neural and Behavioral Sciences</td>
</tr>
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**New Graduate Program, Option, or Minor:** Add

<table>
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<tr>
<th>Designation of new graduate program:</th>
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<tbody>
<tr>
<td>Classification of Instructional Programs (CIP) Code:</td>
</tr>
<tr>
<td>Designation of new graduate option:</td>
</tr>
<tr>
<td>Designation of new graduate minor:</td>
</tr>
</tbody>
</table>

Indicate effective semester:  
First semester following approval  
Second semester following approval

**Existing Graduate Program Option, or Minor:** Change

| Current designation of graduate program: Neuroscience |
| Current designation of graduate option: |
| Current designation of graduate minor: |

New designation of existing graduate program (if changing):  
New designation of existing graduate option (if changing):  
New designation of existing graduate minor (if changing):

Brief description of the change (if not noted above): Adding a joint MD/PhD program in Neuroscience

Indicate effective semester:  
First semester following approval  
Second semester following approval

---

**Submitted by Graduate Program Head**

<table>
<thead>
<tr>
<th>Colin J. Barnstable</th>
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</thead>
<tbody>
<tr>
<td>Date: 4/19/17</td>
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</tbody>
</table>

**Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:**

<table>
<thead>
<tr>
<th>Gail Mathers</th>
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<td>Date: 4/19/17</td>
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**Approved by College/School Dean/Chancellor (or Designee):**

<table>
<thead>
<tr>
<th>Charles H. Lang</th>
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Index to Neuroscience joint degree proposal with the M.D./Ph.D. program

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NEW PROGRAMS, OPTIONS* AND MINORS**

A. Program Objectives.

The National Institutes of Health (NIH) has long recognized the need for dually trained physician-scientists to translate the discoveries of basic science laboratories into effective clinical treatments. Scientists with doctoral level training in both the practice of clinical medicine and research are among the most important practitioners of this critical step in the discovery of new medical treatments. The College of Medicine has had a formal M.D./Ph.D. training program in support of this goal since 1988.

The NIH supports the training of such scientists through its Medical Scientist Training Program (MSTP), and the M.D./Ph.D. Program is currently the recipient of an MSTP award. The College of Medicine M.D./Ph.D. program has established joint degree programs with Engineering Science and Mechanics, Molecular and Cellular Integrative Biosciences, and the Biomedical Sciences (BMS) graduate programs. Recently the NIH and others have recognized the need to give this training area more attention; the NIH’s Clinical and Translational Science Awards (CTSA) have a stated intent to further build this critical research capacity. The objective of the M.D./Ph.D. program is to establish a nationally recognized training program that gives students the greatest flexibility to combine the medical training at Hershey with the strength in research throughout Penn State, including that at University Park.

As part of the effort to partner medical training and life science research in the most productive manner at Penn State, M.D./Ph.D. students accepted to the M.D./Ph.D. program at the College of Medicine have always been encouraged to fully explore all options for their Ph.D. training at both Hershey and University Park. This open access to research at both campuses allows the program to attract the best students, and also to match students with labs that fit their interests and motivation as closely as possible. We have identified specific faculty to be included in the training grant. Access to other faculty members who have not been approved is at the discretion of the M.D./Ph.D. co-directors. The proposed joint degree program with Neuroscience (NEURS) will allow M.D./Ph.D. students potential access to a large number of biomedical science laboratories at both the College of Medicine and University Park.

B. New courses to be established as a part of the new offering.

None.

C. Program Statements.

Note: Please see Table 3 at the end of the proposal for a side-by-side comparison of the Ph.D. and M.D./Ph.D. requirements for students in the Neuroscience
Admissions

Students interested in simultaneously pursuing an M.D. and Ph.D. degree must apply to the College of Medicine M.D./Ph.D. program using the national American Medical College Application Service (AMCAS) application system and indicate their intent to pursue the joint degree program. The College of Medicine M.D./Ph.D. Steering Committee, which includes experienced M.D., M.D./Ph.D., and Graduate Faculty members, reviews applications and evaluates candidates for acceptance into both the M.D. and Ph.D. programs. Candidates not accepted into the joint degree program can be referred to either the M.D. or Ph.D. program, depending on their qualifications and interests.

Medical School Years 1 and 2 (MS1, MS2)

During the first two years of medical school, the student conducts at least three research rotations in addition to the standard medical school curriculum. A Pass grade must be earned for all required courses (medical school courses are graded Pass/Fail).

Entry into Graduate Program

During the Fall semester of the second year of medical school (MS2), the student submits the online application to the Graduate School with the required application fee. After successful completion of the first two years of medical school, a passing score on Step 1 of the USMLE and identification of a research mentor, the candidate enters the Neuroscience Graduate Program and their dissertation lab.

Neuroscience Candidacy Examination

During the summer after the second year of medical school M.D./Ph.D. students take Step 1 of the United States Medical Licensing Examination (USMLE), which serves as the Candidacy exam for the Neuroscience program. The content of the first two years of medical school is focused on the biological foundations underlying our understanding of health and disease, including extensive integrated coursework in biochemistry, physiology, pharmacology, neuroscience and related fields. This coursework provides the M.D./Ph.D. student with a strong foundation that will support both their advanced graduate coursework and their intellectual development as a physician scientist. Step 1 extensively assesses the student’s understanding of this material and is extremely rigorous. Thus, passing Step 1 of the USMLE is required for progress in medical school, and provides evidence that the student has mastered the material satisfying the intent of the Candidacy Examination.

Neuroscience Program-Specific Requirements

The doctoral committee of an M.D./Ph.D. student in the Neuroscience program is formed upon entry into the dissertation laboratory. In addition to the general Graduate Council requirements for doctoral committees, the committee must include at least two members of the Neuroscience program graduate faculty and one M.D./Ph.D. steering committee member. The doctoral committee will meet at least two times annually, and the student must submit a
written report to the M.D./Ph.D. administrative office after the meeting using the M.D./Ph.D. specific doctoral committee report form.

In addition to taking the required courses NEURO 590 Colloquium (2 cr.), BMS 591, Ethics in the Life Sciences (1 cr.), and PHS 520 Introduction to Biostatistics (3 cr.), students are required to take the core neuroscience courses NEURO 521 Systems Neuroscience (3 cr.), NEURO 522 Seminar in Neuroscience I (2 cr.), NEURO 523 Seminar in Neuroscience II (2 cr.) and NEURO 530 Professional Development (1 cr.) A minimum of 4 elective credits is required. Other elective courses are selected in consultation with the student’s dissertation adviser and doctoral committee.

**Comprehensive Examination**

The M.D./Ph.D. candidate prepares a written comprehensive examination in the format of an “on topic” F30 grant application and gives an oral presentation of this proposal to their doctoral committee; the exam will be the same for the M.D./Ph.D. students and all other students in the Neuroscience program. It is recommended that the exam be administered in the late spring or early summer following the G1 year of Ph.D. training but prior to registration for the G2 year.

**Doctoral Dissertation**

The requirement for the dissertation is the same for M.D./Ph.D. and Ph.D. students in Neuroscience, with the exception that students are required to have at least one first-author publication accepted or published based on their dissertation research prior to the final oral examination. A student may petition the Chair of the Neuroscience Graduate Program to waive this requirement due to extenuating circumstances (e.g., adviser relocation, abnormal issues with publication process). All waivers must be approved by the Vice Dean for Research and Graduate Studies of the College of Medicine. More information about this expectation is presented in the Return to Medical School section below.

The Neuroscience dissertation requirements for both Ph.D. and M.D./Ph.D. students follow:

All Ph.D. candidates must conduct original research and prepare a dissertation that makes a significant contribution of new knowledge, is presented in a scholarly manner, and demonstrates an ability on the part of the candidate to do independent research of high quality. The contents and conclusions of the dissertation must be defended at the time of the final oral examination.

Students must present their dissertation in accordance with Graduate Council and Graduate School guidelines as described in the [THESIS GUIDE: Requirements for the Preparation of Master's Theses and Doctoral Dissertations](#). The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School, and the student must pass a final oral examination (the dissertation defense).
**Final Doctoral Examination**

This requirement is the same as that for Neuroscience Ph.D. candidates:

The final examination of the doctoral candidate is an oral examination administered and evaluated by the entire doctoral committee. It consists of an oral presentation of the dissertation by the candidate and a period of questions and responses. These will relate in large part to the dissertation, but may cover the candidate’s entire program of study, because a major purpose of the examination is also to assess the general scholarly attainments of the candidate. The portion of the examination in which the dissertation is presented is open to the University community and the public; therefore, it is expected that the examination will take place at University Park or the Hershey campus.

Information regarding Graduate Council requirements for the Ph.D., including the establishment of a doctoral committee; candidacy, comprehensive, and final oral examinations; and submission of a dissertation of original research in the field can be found in the Graduate Degree Programs Bulletin.

**Additional Requirements for Neuroscience students including M.D./Ph.D. students:**

All Neuroscience graduate students must maintain a cumulative grade-point average of > 3.0 to remain in good academic standing. Furthermore, the M.D./Ph.D. student must have a 3.0 to take the comprehensive and the final oral examinations. One or more failing grades (F) or a cumulative grade-point average below 3.0 will be considered evidence of unsatisfactory scholarship and may be grounds for dismissal from the program.

**Return to Medical School**

M.D./Ph.D. students are required to have at least one first-author publication accepted or published based on their dissertation research prior to the final oral examination. A student may petition the Chair of the Neurosciences Graduate Program to waive this requirement due to extenuating circumstances (e.g., adviser relocation, abnormal issues with publication process). All waivers must be approved by the Vice Dean for Research and Graduate Studies of the College of Medicine. Before students return to medical school, the doctoral dissertation must be accepted by the Graduate School.

If a student decides not to return to medical school, or for some other reason is not able to complete the last two years of medical school, but they have successfully completed their Ph.D. dissertation and final oral examination and met all other degree requirements of Neuroscience, they will be able to complete the Ph.D.. The latter will be conferred after the student notifies the program that she/he wishes to withdraw from the M.D. program and completes all requirements for conferral of the graduate degree.

**Dual counting of Courses**

The Graduate Council’s policy on Joint Degree programs expects “that there will be some reciprocity on the part of both programs involved in the Joint offering....”
Table 1. Neuroscience Courses replaced by SPM 711 and NBS 723

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BMS 502</td>
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<tr>
<td>BMS 503</td>
<td>3</td>
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<tr>
<td>NEURO 520</td>
<td>3</td>
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<tr>
<td>NEURO 511</td>
<td>3</td>
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The Neuroscience program will accept passing grades in the medical school courses *SPM 711 Scientific Principles of Medicine* and *NBS 723 Neuroscience* in lieu of 12 required credits from the Neuroscience Core Courses (see Table 1).

SPM 711 and NBS 723 cover foundational science that underlies both medical practice and research in molecular and cellular biology, including cell biology, biochemistry, molecular genetics, histology, microbiology, immunology, cancer biology, neuroscience and pharmacology. Substitution of these medical school courses for 12 credits of Neuroscience required courses (12 credits equals 38% of the Neuroscience credit requirements) meets the Graduate Council’s standard of 20-40% of the graduate programs credits substituted with credits from the professional program.

Because students in the M.D./Ph.D. program are being trained to combine research and medicine, most likely in medical schools, the Neuroscience requirement for exposure to undergraduate teaching is waived. M.D./Ph.D. candidates will not be required to take NEURO 602 Supervised Experience in College Teaching.

The College of Medicine will accept 8 credits of *NEURO 600/601 Thesis Research/Ph.D. Dissertation* conducted over the four years of the graduate portion of the training program in lieu of two months of elective rotations (*MED 797*). In addition, the College of Medicine requires all M.D. students to complete a Medical Student Research project; this requirement is waived for all M.D./Ph.D. students.

D. Admission requirements.

In addition to the basic college level premedical school requirements for the Penn State College of Medicine (one each year of biology, chemistry, physics, math, and organic chemistry), the M.D./Ph.D. program has the following requirements:

- **Academic Achievement.** Applicants to our program generally have very strong grades and MCAT scores. In recent years, successful applicants have an average GPA of 3.75 and total MCAT scores of >85 percentile. Applicants are not required to take the GREs.
- **Research Experience.** We are especially interested in students with a strong and sustained background in research. Students who have spent 1-2 years after graduation conducting research are strongly encouraged to apply. Alternatively in-
depth research experience as an undergraduate can suffice.

- **Recommendations.** We are especially interested in receiving letters of recommendation from faculty with whom you conducted research and who can comment on your passion and potential for research.

- **Goals.** Applicants must be able to clearly articulate the reasons for pursuing the joint degree.

- **International Students.** All qualified students are eligible to apply regardless of citizenship.

**E. Program Justification.**

All medical schools at research-intensive universities offer an M.D./Ph.D. joint degree program, as Penn State has since 1988. This proposal extends that program to our Ph.D. program in Neuroscience at the College of Medicine and at University Park. Creating a joint degree program with Neuroscience will allow M.D./Ph.D. students to choose dissertation research labs at either the College of Medicine or University Park, an important aspect of the program for recruiting, grant-writing and evaluation purposes.

The breadth of research represented by the program faculty in the Neuroscience program will be a major attraction to potential M.D./Ph.D. students and is expected to result in increased interest from highly qualified applicants.

**F. Accreditation:**

There is no specific accrediting body for M.D./Ph.D. joint degree programs. The Liaison Committee on Medical Education (LCME) accredits M.D. programs (evaluation of M.D./Ph.D. programs are reviewed as part of that accreditation if they exist). The College of Medicine M.D. program was reviewed by the LCME in 2010 and was fully accredited for 7 years (the maximum allowed) with recognition of the many strengths of the program. As indicated above, securing MSTP funding from NIH is an independent mark of high quality.
<table>
<thead>
<tr>
<th>Course Overview: NEUROSCIENCE PROGRAM</th>
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<tbody>
<tr>
<td>Ph.D. – 32 credits required</td>
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<tr>
<td>26 Core Requirement credits</td>
</tr>
<tr>
<td>Up to 6 Elective credits</td>
</tr>
<tr>
<td>6+ Research credits</td>
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<tr>
<td>M.D./Ph.D. – 32 credits required</td>
</tr>
<tr>
<td>28 Core Requirement Credits</td>
</tr>
<tr>
<td>4 Elective credits</td>
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<tr>
<td>6+ Research credits</td>
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### Core Requirements

<table>
<thead>
<tr>
<th>BMS 502 (3 credits)</th>
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<tbody>
<tr>
<td>BMS 503 (3 credits)</td>
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<tr>
<td>NEURO520 – Cellular &amp; Molec Neurobiology (3 credits)</td>
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<tr>
<td>NEURO 511 – Human Neurobiology (3 credits)</td>
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<tr>
<td>NEURO521 – Systems Neuroscience (3 credits)</td>
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<tr>
<td>NEURO522 – Seminar in Neuroscience (2 credits)</td>
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<td>NEURO523 – Seminar in Neuroscience (2 credits)</td>
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<tr>
<td>NEURO590 – Colloquium (2 credit)</td>
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<tr>
<td>PHS 520 - Introduction to Biostatistics (3 credits)</td>
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<tr>
<td>BMS 591- Ethics in the Life Science (1 credit)</td>
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<tr>
<td>NEURO530 – Professional Development (1 credit)</td>
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<tr>
<td>NEURO 602. Superv. Exp. In College Teaching (1 credit)</td>
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<tr>
<td>SPM711 – Scientific Principles of Medicine (11 credits)</td>
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<tr>
<td>NBS723 – Neuroscience (3 credits)</td>
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<tr>
<td>NEURO521 – Systems Neuroscience (3 credits)</td>
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<tr>
<td>NEURO522 – Seminar in Neuroscience (2 credits)</td>
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<td>NEURO523 – Seminar in Neuroscience (2 credits)</td>
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<tr>
<td>NEURO590 – Colloquium (2 credit)</td>
</tr>
<tr>
<td>PHS 520 - Introduction to Biostatistics (3 credits)</td>
</tr>
<tr>
<td>BMS 591- Ethics in the Life Science (1 credit)</td>
</tr>
<tr>
<td>NEURO530 – Professional Development (1 credit)</td>
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### Elective

| Per student advisor and program (3 credits) |
| Per student advisor and program (3 credits) |
| Per student advisor and program (2 credits) |
| Per student advisor and program (2 credits) |

### Research Credits

| NEURO600 and 601 (6+ credits) |
| NEURO600 and 601 (6+ credits) |
Bulletin Copy

Neuroscience (NEURS)

Program Home Page

COLIN BARNSTABLE, Co-Director of Neuroscience Program
College of Medicine, University Hospital
Penn State Milton S. Hershey Medical Center
Hershey, PA 17033
717-531-1045
Neuro-grad-hmc@psu.edu

KEVIN ALLOWAY, Co-Director of Neuroscience Program
W316 Millenium Science Complex
University Park, PA  16802
814-867-6413
kda1@psu.edu

Degrees conferred:

Ph.D., M.S.

Dual-title Ph.D. in Neuroscience and Clinical and Translational Sciences

M.D./Ph.D.

The Graduate Faculty

The Program

The Neuroscience (NEURS) Graduate Program provides students curricular training with a broad focus on neuroscience, and the opportunity for concentrated research in a variety of disciplinary approaches to neuroscience such as biochemistry, cell biology, embryology, genetics, immunology, neuroscience, pharmacology, physiology, structural biology, and virology. Students receive rigorous training that provides the skills necessary to be leaders in biomedical research and other endeavors that benefit from a rigorous scientific background, including education, law, journalism, and public policy.

The first-year Fall curriculum provides 6 credits of Biomedical Sciences that encompasses 6 modules providing underlying principles of basic cellular processes of medical sciences as well as an introduction to Cellular and Molecular Neuroscience (3 credits). In addition, the Fall curriculum includes a one-credit Colloquium which introduces the student to professionalism,
scientific communication, and addresses manuscript evaluation and writing, as well as scientific methodology and techniques that will be discussed in subsequent coursework. The first Spring curriculum includes one 3-credit course focusing on neuroanatomical studies (NEURO 511) followed by a systems neuroscience course (NEURO 521). During the first year, students complete three research rotations that expose them to the wide range of research interests of The Pennsylvania State University graduate faculty from both basic and clinical science departments at the College of Medicine in Hershey. These rotations serve to inform the students with regard to choosing a thesis or dissertation adviser and forming a master’s or doctoral committee. In addition, students are advised to take ethics, statistics and electives. The doctoral students also complete their candidacy examination which entails an oral presentation and a written examination on anatomical coursework. Successful completion of the Program results in conferral of the master’s or doctoral degree in Neuroscience.

The Neuroscience Graduate Program is an interdepartmental program that engages faculty from multiple basic science and clinical science departments. This broad-reaching Program provides students a wide ranging understanding of multiple disciplines with specific expertise in a chosen area, and encourages interdisciplinary research that is the hallmark of biomedical sciences in the 21st century.

Admissions Requirements

Admission requirements listed here are in addition to requirements stated in the GENERAL INFORMATION section of the Graduate Bulletin. Applicants apply for admission to the program via the Graduate School application for admission Ph.D., M.S.

Prospective applicants should have a bachelor's degree in a biological, physical, or behavioral science and are expected to have taken undergraduate courses in biology, chemistry, physics, and mathematics. Candidates are expected to have a 3.0 (B) grade-point average or better. Neuroscience courses are desirable but not essential and research experience is an advantage. The General Test of the Graduate Record Examinations (GRE), or a comparable substitute examination accepted by the Neuroscience graduate program, is required for all applicants.

A complete application will include: completed online application form with personal statement of purpose; GRE scores; official transcripts from all post-secondary institutions attended; three letters of recommendation; and TOEFL scores (if applicable).

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. Consult the English Proficiency section of the Graduate Bulletin Application and Admission Procedures page for more information.
The application deadline is December 15 for admission in the following fall.

Qualified applicants generally will be requested to visit the College of Medicine in Hershey, PA for an interview. Admission is based on evaluation of the undergraduate transcript, GRE scores, personal statement of purpose, letters of recommendation, and performance at the interview.

Dual-Title Ph.D. Degree in Neuroscience and Clinical and Translational Sciences

Potential dual-title students can express an interest in the CTS dual-title as early as during the recruitment process for the Neuroscience Graduate Program. Students must apply and be admitted to the graduate program in Neuroscience and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the CTS dual-title program. Refer to the Admission Requirements section of the CTS Bulletin page. Doctoral students must be admitted into the dual-title degree program in CTS prior to obtaining candidacy in Neuroscience.

Students interested in the Dual-Title Degree will be considered for admission to the Clinical and Translational Sciences Program by a committee consisting of the Clinical and Translational Sciences Program co-directors and faculty affiliated with the Clinical and Translational Sciences Dual-Title Program. To apply, the student must submit the following documentation to the Clinical and Translational Sciences Dual-title Program:

1. A statement of interest, including the applicant’s reasons for pursuing a career that includes clinical/translational science.
2. A letter from the applicant’s research adviser which endorses the applicant’s participation in the Clinical and Translational Sciences Dual-title Program.
3. A letter of support from the head of Neuroscience. If the applicant has not yet selected a research adviser, the program head’s letter should describe the program’s support of the applicant’s desire to incorporate clinical/translational research in the applicant’s training plans.
4. A description of the applicant’s academic performance to date.

M.D./Ph.D.

Applicants to the joint M.D./Ph.D. degree program must apply and be admitted to both the Neuroscience graduate program and the College of Medicine.

Students interested in simultaneously pursuing an M.D. and Ph.D. degree must apply to the College of Medicine M.D. program using the national American Medical College Application Service (AMCAS) application system and indicate their intent to pursue the joint degree program. Admissions requirements and applications for admission for Penn State College of Medicine are available at the M.D. Program section of the Penn State College of Medicine website. The College of Medicine M.D./Ph.D. Admissions Committee reviews applications and
evaluates candidates for acceptance into both the M.D. and Ph.D. program. Students not accepted into the joint degree program can be referred to either the M.D. or Ph.D. program, depending on their qualifications and interests.

After the review committee has accepted an applicant to the joint degree program, s/he must apply and be admitted to the Graduate School for admission to the graduate program. The general admission requirements for the Ph.D. degree are listed above. Additional requirements for the joint degree are listed below.

- **Academic Achievement.** Applicants to our program generally have very strong grades and MCAT scores. In recent years, successful applicants have an average GPA of 3.75 and total MCAT scores of >85 percentile. Applicants are not required to take the GREs.

- **Research Experience.** We are especially interested in students with a strong and sustained background in research. Students who have spent 1-2 years after graduation conducting research are strongly encouraged to apply. Alternatively in-depth research experience as an undergraduate can suffice.

- **Recommendations.** We are especially interested in receiving letters of recommendation from faculty with whom you conducted research and who can comment on your passion and potential for research.

- **Goals.** Applicants must be able to clearly articulate the reasons for pursuing the joint degree.

- **International Students.** All qualified students are eligible to apply regardless of citizenship.

**Degree Requirements**

**Ph.D. degree in Neuroscience**

Requirements listed here are in addition to requirements stated in the DEGREE REQUIREMENTS section of the Graduate Bulletin.

A minimum of 32 credits is required for the Ph.D. degree: 15 credits of core requirements, 11 credits of program requirements, and 6 credits of electives. The 15 credits of core requirements are: BMS 502 (3 cr.), BMS 503 (3 cr.), NEURO 511 (3 cr.), NEURO 520 (3 cr.), and NEURO 521 (3 cr.). The 11 credits of program requirements are: PHS 520 (3 cr.), NEURO 522 (2 cr.), NEURO 523 (2 cr.), NEURO 530 (1 cr.), NEURO 590 (2 cr.), and BMS 591 (1 cr.). In addition, Ph.D. students are required to complete 1 credit of Supervised Experience in College Teaching (NEURO 602); however, this 1 credit cannot be counted towards the minimum 32 credits required. A minimum of 6 elective credits is required. A student’s doctoral committee can require additional course work depending on the student’s background and research plans.

Official entrance into the Ph.D. program occurs upon successful completion of the candidacy examination. Ph.D. degree requirements include successful completion of the following: approved graduate course work, English Competence requirements, a comprehensive examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree,
doctoral candidates must write a dissertation that is accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

**M.S. degree in Neuroscience**

Requirements listed here are in addition to requirements stated in the [DEGREE REQUIREMENTS](#) section of the Graduate Bulletin.

A minimum of 30 credits at the 400, 500, 600, or 800 level is required for the M.S., with at least 18 credits at the 500 and 600 level, combined. There are 15 credits required in the following core courses: NEURO 511 (3 cr.), NEURO 520 (3 cr.), NEURO 521 (3 cr.), NEURO 522 (2 cr.), NEURO 523 (2 cr.), NEURO 530 (1 cr.), and BMS 591 (1 cr.). A thesis is required, and a minimum of six (6) thesis research credits (SUBJ 600 or 610) must be taken in Neuroscience. The remaining elective credits may be chosen from a list of approved electives maintained by the program office. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

**Dual-Title Ph.D. in Neuroscience and CTS Degree Requirements**

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Neuroscience, listed above. In addition, students must complete the degree requirements for the dual-title in CTS, listed on the CTS Bulletin page. Up to 7 credits of coursework may be used to satisfy both Neuroscience and CTS degree requirements. In addition, a student may request to double count additional credits up to a maximum of 12. A student may request additional double-count credits up to a total maximum of 12 double-count credits. An increase in double-counted credits will be determined by the CTS Program on a case-by-case basis.

Neuroscience graduate students accepted to the Clinical and Translational Sciences Dual-Title Program will take the candidacy exam by the end of the fourth semester of the graduate training program: 1) to allow exposure to the Clinical and Translational Sciences Curriculum in the Spring semester of the first year and Fall semester of the second year, which will prepare the students for the integrated content of the dual-title candidacy exam, and 2) to allow sufficient time to identify and assure commitment of an appropriate dissertation adviser who embraces the dual-title program of the student. During the candidacy examination, the student will also be assessed for candidacy to the dual-title program, and at least one member of the candidacy committee must come from the dual-title program. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role.

In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of a Neuroscience and Clinical and Translational Sciences dual-title doctoral degree candidate must include at least one member of the Clinical and Translational Sciences Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the doctoral committee is not also a member of the
Graduate Faculty in CTS, the member of the committee representing CTS must be appointed as co-chair. The CTS representative on the student's doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students enrolled in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and expertise in both Neuroscience and Clinical and Translational Sciences. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

M.D./Ph.D. Degree Requirements
Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the M.D. program are listed on the M.D. Program section of the Penn State College of Medicine website. Degree requirements for the Ph.D. degree are listed above.

During the first two years of medical school, the student conducts at least three research rotations. In addition, students are required to take BMS 506A and 506B during the M1 (Spring) and M2 (Fall), as well as either a 1 credit course in genetics or immunology. After successful completion of the first two years of medical school the candidate joins their dissertation lab in the Neuroscience Graduate Program.

During the summer after the second year of medical school M.D./Ph.D. students take Step 1 of the United States Medical Licensing Examination (USMLE), which serves in lieu of the knowledge-based portion of the Candidacy Examination for the Neuroscience program.

The doctoral committee of an M.D./Ph.D. student in the Neuroscience program is formed upon entry into the dissertation laboratory. In addition to the general Graduate Council requirements for doctoral committees, the committee must include at least two members of the Neuroscience program Graduate Faculty and one M.D./Ph.D. steering committee member.

In addition to taking the required courses NEURO 590 Colloquium (2 cr.), BMS 591, Ethics in the Life Sciences (1 cr.), and PHS 520 Introduction to Biostatistics (3 cr.), students are required to take the core neuroscience courses NEURO 521 Systems Neuroscience (3 cr.), NEURO 522 Seminar in Neuroscience I (2 cr.), NEURO 523 Seminar in Neuroscience II (2 cr.), and NEURO 530 Professional Development (1 cr.). A minimum of 4 elective credits is required. Other elective courses are selected in consultation with the student’s dissertation adviser and doctoral committee.

The Neuroscience program will accept passing grades in the medical school courses SPM 711 Scientific Principles of Medicine (11 cr.) and NBS 723 Neural and Behavioral Science (3 cr.) in lieu of 12 required credits for the Neuroscience Ph.D. The 12 required credits are BMS 501 (3 cr.), BMS 502 (3 cr.), NEURO 520 (3 cr.), and NEURO 511 (3 cr.). M.D./Ph.D. candidates are not
required to take NEURO 602 Supervised Experience in College Teaching (1 cr.).

The M.D./Ph.D. candidate prepares a written comprehensive examination in the format of a grant application and gives an oral presentation of this proposal to their doctoral committee.

M.D./Ph.D. candidates are required to have at least one paper accepted for publication in a major peer-reviewed scientific journal prior to the final oral examination, and this must be accepted before they return to the third year of medical school. A student may petition to waive this requirements due to extenuating circumstances (e.g., adviser relocation, abnormal issues with publication process). All waivers must be approved by the Vice Dean for Research and Graduate Studies of the College of Medicine. A dissertation must be prepared and defended by each M.D./Ph.D. candidate prior to returning to the M3 year of medical school. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School, and the student must pass the final oral examination (the dissertation defense). If a student decides not to return to medical school, or for some other reason is not able to complete the last two years of medical school, but they have successfully completed their Ph.D. dissertation and final oral examination and met all other degree requirements of the Neuroscience program, they will be able to complete the Ph.D.. The latter will be conferred after the student notifies the program that she/he wishes to withdraw from the M.D. program and completes all requirements for conferral of the graduate degree.

**Student Aid**

Graduate assistantships and other forms of student aid are described in the [STUDENT AID section of the Graduate Bulletin](#). Students on graduate assistantships must adhere to the [course load limits set forth in the Graduate Bulletin](#). All support is continuous for the first year from the Neuroscience program. Support in years two and above, when the student is conducting dissertation research, must be acquired from either the basic science department in which the candidate elects to pursue his/her minor or from funds available from the dissertation adviser. These funds must be secured by the student in conjunction with his/her adviser.

**Courses**

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

[NEUROSCIENCE (NEURO) course list](#)
Index of consultation/support letters

Page 17. letter of support from the M.D./Ph.D. program co-directors, Dr. Bob Levenson and Dr. Leslie Parent

Page 18. letter of support from Dr. Craig Hillemeier, Dean of the Medical School

Page 19. letter of support from Dr. Charles Lang, Associate Dean for Graduate Studies in the College of Medicine

Page 20. Letter of support from Dr. Kevin Alloway, University Park Director of the Neuroscience IDGP

Page 21. Email of support from Dr. Douglas Teti, head of Human Development and Family Studies.
Date: March 15, 2017

To: Charles H. Lang, PhD; Associate Dean for Graduate Studies
Neuroscience Graduate Program Advisory Committee

Dear Chuck and Neuroscience Advisory Committee Members,

Thanks for sending the proposal describing the formation regarding a joint M.D./Ph.D. degree program in the Neuroscience Graduate Program at the Penn State College of Medicine.

After reviewing this proposal, we are highly supportive of this effort. The Neuroscience Graduate Program is a long-established program with exceptional faculty with a strong track record of research scholarship and mentoring. The Program and its faculty will provide a variety of curricular specializations that will appeal to M.D./Ph.D. students with different research interests. In particular, we have a number of students who have expressed an interest in various aspects of neuro- and behavioral sciences that are the focus of your graduate program. Our students will undoubtedly find excellent faculty mentors with wide-ranging scientific interests as part of this joint degree program.

We anticipate that many students in the Medical Scientist Training Program will choose to join the Neuroscience Graduate Program.

Sincerely,

Leslie J. Parent, M.D.
Vice Dean for Research and Graduate Studies
Associate Vice President for Health Sciences Research
Professor of Medicine and Microbiology & Immunology
Co-Director, Medical Scientist Training Program

Robert Levenson, Ph.D.
Distinguished Professor of Pharmacology and of Neural and Behavioral Sciences
Co-Director, Medical Scientist Training Program
To: Subcommittee on New and Revised Programs and Courses
   The Graduate Council

From: Dr. A. Craig Hillemeier, Dean, Chief Executive Officer, and Senior Vice President for Health Affairs

Date: March 17, 2017

Subject: Support of Joint MD/PhD Degree Program in the Neuroscience Graduate Program at the Penn State College of Medicine

Dear Committee Members:

I am pleased to enthusiastically and without reservation support the attached proposal describing the formation of a joint MD/PhD degree program in the Neuroscience Graduate Program at the Penn State College of Medicine. Such a program is a natural extension of our College and University efforts towards advancing translational research. The expansion of the joint degree to include the graduate program in Neuroscience, that is the home for a cadre of internationally and nationally renowned scientists, will significantly enhance the recruitment of high-achieving undergraduate students into our MSTP-funded MD/PhD degree program at the College of Medicine. Conversely, the ability of the Neuroscience graduate program to enroll MD/PhD students is anticipated to enhance quality recruitment efforts, and will make this graduate program comparable to that of our Biomedical Sciences (BMS) graduate program. We have both the resources and infrastructure necessary within the program to accommodate this change and expansion.

Thank you for your time and cooperation in consideration of this program proposal.

Sincerely,

A. Craig Hillemeier, MD
Dean, Penn State College of Medicine
Chief Executive Officer, Penn State Health
Vice-President for Health Affairs, Penn State
March 15, 2017

Subcommittee on New and Revised Programs and Courses
The Graduate Council
The Graduate School
The Pennsylvania State University

Dear Colleagues,

I am pleased to submit this Program Revision to The Graduate School for consideration. This proposal describes our intent to offer a joint MD/PhD degree in the Neuroscience Graduate Program.

As you will note, the Co-Directors of the MSTP-funded MD/PhD Program enthusiastically support the program change and understand that this broaden the number and types of laboratories that their students might enter. Furthermore, there is substantial interest in MD/PhD students in the general area of neuroscience, and this change is expected to improve our recruitment of such students in the Program.

I look forward to your reply, and would be happy to answer any questions that might arise.

Sincerely,

Charles H. Lang, PhD
Associate Dean for Graduate Studies
Distinguished Professor of Cellular & Molecular Physiology
May 15, 2017

Graduate Council Joint Curricular Committee
The Graduate School
Dean's Office
211 Kern Graduate Building
The Pennsylvania State University
University Park, PA 16802

Dear Joint Curricular Committee Members:

During this past year, faculty in the Neuroscience graduate program (NEURS) have discussed a formal program leading to the M.D./Ph.D. degree. The objective of the M.D./Ph.D. program is to establish a nationally recognized training program that gives students the greatest flexibility to combine the medical training at Hershey with the strength in research throughout Penn State, including that at University Park.

The Neuroscience component of the proposed M.D./Ph.D. program will provide doctoral students curricular training with a unique focus on human health and disease and the opportunity to concentrate in one or more areas that integrate the development and function of the brain, neural processing of information and regulation of body function and behavior, and diagnosis, prevention, and treatment of brain and neurodegenerative diseases. Pairing of the two training experiences in the proposed M.D./Ph.D. will create new opportunities for interdisciplinary scholarship at the interface of basic science, clinical application, and human health.

The University Park branch of the Neuroscience IDGP welcomes this program and we wholeheartedly endorse the proposal. If there is any additional information I can provide, please let me know.

Sincerely,

Kevin D. Alloway, Ph.D.
Professor of Neural and Behavioral Sciences
Co-Director, Interdepartmental Program in Neuroscience
Colin J. Barnstable, D.Phil.
Professor and Chair, Department of Neural and Behavioral Sciences
Professor of Psychiatry
Research Director, Penn State Hershey Eye Center

From: DOUGLAS MICHAEL TETI <dmt16@psu.edu>
Sent: Monday, May 29, 2017 1:34 AM
To: Barnstable, Colin
Subject: Re: Neuroscience joint degree with M.D./Ph.D. Program

Hello Colin. Thanks for the opportunity to take a look at this. The proposal looks find and I'm happy to give this dual MD/Ph.D. my support. It formalizes what is already in place, always a good idea, and showcases the versatility of the Neuroscience graduate program. I wish you success with this.

Doug

Douglas M. Teti, Ph.D.
Professor of Human Development, Psychology, and Pediatrics
Head, Human Development and Family Studies
119 Health and Human Development Building
The Pennsylvania State University
University Park, PA 16802
814-863-9570 (Office)
E-mail: dmt16@psu.edu

My faculty web page:
http://www.hhdev.psu.edu/hdfs/faculty/teti.html

Families-at-Risk Faculty Research Initiative web page
http://csc.psych.psu.edu/initiatives/families-at-risk