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.

September 7, 2016

Graduate Degree Programs

CHANGE

Literacy Education – change in degree requirements (Penn State Harrisburg), page 5

Plant Pathology – adopt dual-title Ph.D. in Biogeochemistry (College of Agricultural Sciences), page 23

Graduate Courses

CHANGE

OLD

EDUC 564
Reading Clinic
READING CLINIC (6)
Culminating course for the M.Ed. degree in literacy education requiring demonstration of competency in working with children possessing reading problems.
APPROVED START: FA2008

NEW

EDUC 564
Reading Clinic
READING CLINIC (3-6)
This capstone course for the Master of Education in Literacy Education with the Reading Specialist certification is designed to address the major theories and empirical research that addresses the cognitive, linguistic, motivational, and sociocultural foundations of literacy development, processes, and components, including word recognition, language comprehension, strategic knowledge, and reading-writing connections. To demonstrate mastery of these concepts, participants engage in an action research case study project in which they design, develop, and implement curriculum to meet the needs of K-12 students who are struggling with literacy. Through this case study, participants demonstrate and apply pedagogical and professional knowledge, skills, and dispositions. Participants select a variety of appropriate texts, engage students' backgrounds and interests, and administer appropriate assessments to evaluate and monitor progress. Participants also have the opportunity to
further enhance their ability to collaborate with professional colleagues, interact with students' families, and demonstrate leadership in literacy education.

PROPOSED START: FA2016

OLD
GEOG 883
Remote Sensing Analysis and Applications
GEOINT REMOTESENSI (3)
Understanding remote sensing systems' operation, data products, and processing techniques to address typical problem scenarios faced by the GEOINT professional.
APPROVED START: SP2016

NEW
GEOG 883
Remote Sensing Image Analysis and Applications
RS IMAGE ANALYSIS (3)
GEOG 883 focuses on the use of medium and high resolution remotely-sensed imagery and elevation data in geospatial applications. This course assumes that students have prior knowledge in the basics of remote sensing, mapping, and GIS, and that they have prior experience with commonly used geospatial software. In GEOG 883, students will develop mastery of the tools and techniques used to display, process, and analyze remotely sensed data. Upon completion of GEOG 883 students will be able to develop analytical workflows to derive products and extract information from remotely sensed data for a broad range of applications using both pixel-based and object-based approaches.
PROPOSED START: FA2016

OLD
HIST 530
Methods in the History of Science and Technology
HIST SCI & TECH (3-6)
Modern research methods and historiographical controversies in the history of science and technology.
APPROVED START: SU1994

NEW
HIST 530
History of Science in the Early Modern World
HIST SCI E MODERN (3)
This course exposes students to the current state of scholarship from the standpoint of historical, legal, sociological, and literary analyses of science in the early modern period. The inadequacy of long-accepted notions of “science” and “modernization” to describe the rapid changes of scientific thought in the early modern era require students to assess the specific value given to such notions by the state, religion, and society in specific cultural and historical contexts. The seminar will also explore the reconceptualization of society and nature in the early modern period and the way in which discoveries in natural philosophy inspired those changes. The exchanges between European and non-European centers of authority during the early modern period helped to shape many of these disputes and scholars’ current interpretive frameworks.
In particular, we will challenge triumphal narratives of the Scientific Revolution by examining the ways in which geography and local context affected ideas about the natural world, the role of gender in knowledge-making, and how non-elite and artisanal practices also contributed to the creation of early
science. A focus throughout the course will be on how the exchanges between European and non-European intellectual communities shaped contemporary understanding of the natural world. The seminar is intended for graduate students in history and related fields who are preparing for the field in Early Modern studies. The seminar is intended for graduate students in history and related fields who are preparing a field in early modern studies.

PROPOSED START: FA2016

OLD
HIST 545
Emergence of Modern America, 1860-1919
EMERENCE MOD (3-6)
Social, political, economic, and cultural history of the United States from the Civil War through Progressivism and World War I.
APPROVED START: FA2013

NEW
HIST 545
United States History, 1877 to Present
US 1877 TO PRESENT (3)
Primarily a reading seminar, this course focuses on United States history from 1877 to the present, emphasizing the profound ways the nation changed socially, culturally, economically, and politically since the late nineteenth century. In particular, the course investigates and builds an awareness of the transition from the Gilded Age through the two world wars, and onward through the social protest and civil rights movements of the 1960s. This seminar will address a variety of topics: industrialization; evolving ideas about individual rights; the role of government in social and economic affairs; the emergence of the nation as an economic and military power; as well as social and labor movements. On a methodological level, the seminar will expose graduate students to a variety of interdisciplinary approaches and subfields of history, ranging from political, economic, social, ethnic, religious, cultural, and environmental history.
PROPOSED START: FA2016

OLD
INTAF 805
INTERNATIONAL ECON (3)
International Economics: Principles, Policies, and Practices (3) Addresses principles, policies, and practices in international trade and finance that are fundamental for understanding international economic relations.
APPROVED START: SU2008

NEW
INTAF 506
INTERNATIONAL ECON (3)
This course addresses the principles, policies, and practices in international trade and finance that are fundamental for understanding international economic relations and the future of the global economy. The course examines the economic principles underlying behaviors and policies in
international and domestic public affairs and explains how to evaluate and conduct economic analyses.

PROPOSED START: FA2017

OLD
S PSY 556
Psychological Assessment of Pre-school and School-Aged Children
PSY ASMT CHILD (2)
Study of cognitive/affective tests; use of systems--analytic, multivariate statistical, actuarial methods of data combination in decision-making processes.
APPROVED START: SU 2011

NEW
S PSY 556
Psychological Assessment of Pre-school and School-Aged Children
PSYCH ASSMT CHILD (3)
Study of cognitive/affective tests; use of systems (analytic, multivariate statistical, actuarial methods of data combination) in decision-making processes.
PROPOSED START: FA2016
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 Curriculum Coordinator, University Faculty Senate, 101 Kent Graduate Building, University Park. The proposals will be transmitted to the Office of the Dean of the Graduate School for entry into the Graduate Council curricular review process; 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: Penn State Harrisburg
Department or Instructional Area: School of Behavioral Science and Education

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: M.Ed. Literacy Education
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):

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

Submitted by Graduate Program Head
Catherine Surra
Printed name
Signature Date: 4-15-15

Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:
Janet Duck
Printed name
Signature Date: 4-29-2015

Approved by College/School Dean/Chancellor (or designee):
Peter Idowu
Printed name
Signature Date: April 30, 2015
<table>
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<td>Luis Ayala</td>
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<td>9/7/2014</td>
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<tr>
<td>On behalf of</td>
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<td>Chair, Graduate Council Committee on Programs</td>
<td>Andris Freivalds</td>
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<tr>
<td>Dean of the Graduate School</td>
<td>Regina Vasilatos-Younken</td>
<td>Signature</td>
<td>9/7/2014</td>
</tr>
</tbody>
</table>
Proposal for Changes to the Literacy Education, M.Ed.
Teacher Education Division, School of Behavioral Sciences and Education, Penn State Harrisburg

Table of Contents

SECTION A: Justification for Changes

SECTION B: Brief Summary of Changes
Old Program Listing
New Program Listing (with track changes)

SECTION C: Consultation Chart

SECTION D: SARI Requirements

SECTION A: Justification for Changes Made (such as updating instruction, together with an indication of expected enrollments and any effects on existing programs)

Faculty in the Literacy Education Program continually evaluate the academic program quality and make periodic adjustments to meet state and national standards. During the self-evaluation process required for accreditation by the Council of the Accreditation of Educator Preparation (CAEP), formerly known as the National Council of Accreditation of Teacher Education (NCATE), standards required by the International Literacy Association (ILA) and National Council for Teachers of English (NCTE), we engaged in an in-depth examination of our program scope and sequence. As a result of that examination, we recognized course content overlaps. The elimination of 9 credits will allow the program to address all necessary competencies to maintain CAEP accreditation while making the program more cost-effective for prospective students. The reduction of courses will also allow us to compete with a declining economy and an influx of institutions in our region and potentially increase enrollments.

In order to maintain program quality while reducing credits, the content of EDUC 425 (see course key below) will be woven into the following courses: EDUC 477, EDUC 452, and EDUC 562. The content of EDUC 471 will be woven into the following courses: EDUC 477, EDUC 452, LL ED 445, and EDUC 561. In place of EDUC 471, EDUC 472 will be added as an elective to address the increased emphasis on teaching literacy through subject area content and offer an elective geared toward middle and secondary education certified students. The changes to existing course will be less than 20%. In place of EDUC 586, a research course specifically related to language and literacy education will be added to provide students a more in-depth and comprehensive program grounded in language and literacy research. ENGL 409 will be removed as an option because we are no longer offering a writing option. Rather, we offer the opportunity for students to become National Writing Project Fellows by taking EDUC 452 and selecting 3 additional credits from the following choices: EDUC 565, EDUC 432, LLED 445, or EDUC 472. Finally, the capstone course, EDUC 564 will be reduced from 6 to 3 credits. Instead of the
capstone (Reading Clinic) being offered in the summer for 6 credits, we have redesigned a clinic experience during the academic year. Students will register for EDUC 563 in their final fall semester and EDUC 564 in their final spring semester. Students will engage in a year-long (fall and spring) inquiry project in their own teaching context under the guidance and supervision of Literacy Education faculty. This will allow students to engage in teacher inquiry related to assessing and diagnosing literacy challenges in an authentic classroom environment while, at the same time, providing leadership and professional development in their own teaching context.

Previously, we allowed students to choose between LL ED 445 and EDUC 466. EDUC 466 is an introductory course, focusing on English Language Learners (ELLs), while LL ED 445 is an advanced course that addresses ELLs within a literacy-learning framework. Based on student performance in subsequent coursework after taking EDUC 466, we determined that a more advanced course was needed. We are removing EDUC 466 as a listed option and requiring LL ED 445. This hybrid course addresses ELL education specifically for Reading Specialists and other literacy professionals.

Since teachers with provisional certification must complete 24-credits of advanced studies to become permanently certified (Instructional II), teachers usually choose to enroll in a master’s degree program. The revised program will allow these teachers to obtain a master’s degree by taking three 3-credit courses in addition to these 24 credits.

The revised program will be implemented the semester immediately following approval.

**Course Key:**

*EDUC 425. Literacy Assessment (3)

*EDUC 471. Best Practices in Literacy (3)

EDUC 452. Teaching Writing (3)

EDUC 477. Teaching Struggling Readers and Writers (3)

LL ED 445. Teaching English in Bilingual/Dialectal Education (or an equivalent ELL course approved by the program coordinator) (3)

*EDUC 466. Foundations of Teaching English as a Second Language (3)

EDUC 561. Psychology of Reading (3)

EDUC 562. Diagnostic Evaluation of Reading Problems (3)

EDUC 563. Advanced Methods of Teaching Reading (3)

EDUC 564. Reading Clinic (6) (Reducing to 3 credits)

EDUC 565. Literacy Leadership (3)
SECTION B: Revisions: Brief summary of changes, current bulletin listing, new bulletin listing using track changes

Brief Summary of Changes

Students in the Literacy Education M.Ed. are currently required to take 42 credits to graduate. The revised program will require 33 credits.

Changes to Required Courses

1. Two courses will be eliminated from required courses: EDUC 425 and EDUC 471
2. Two courses will be changed from required courses to electives: EDUC 422 and EDUC 432 and one additional course will be added as a possible elective*: EDUC 472
3. LLED 445 rather than EDUC 466 will be a required course.
4. EDUC 564 will be reduced from 6 to 3 credits. EDUC 563 and EDUC 564 will constitute the new capstone.
5. LLED 594 rather than EDUC 586 will be a required course.

*Students will now choose to take 6 credits from the following courses: EDUC 422, EDUC 432, and EDUC 472

Current Bulletin Listing

Literacy Education (LEDUC)

Program Home Page

LAURA ROY, Program Coordinator
Penn State Harrisburg
Middletown, PA 17057
717-948-6213

Degree Conferred:
The Program
The Master of Education in Literacy Education at Penn State Harrisburg is designed to provide full-time and part-time graduate students with a focused program of study in the field of reading education. The program is aligned with the standards of the Pennsylvania Department of Education. Following successful completion of the program, students are eligible to take the Praxis examination for certification as a reading specialist (K-12). Specifically, the goals of the program are to develop in students: (1) specialized, in-depth knowledge about the teaching of reading and writing; (2) the clinical skills necessary for diagnosing and intervening with reading disabled students; (3) the ability to interpret and to evaluate literacy research, (4) the literacy leadership skills necessary to support the professional practices in a K-12 setting; (5) provide rigorous offerings aligned with the standards of the International Reading Association (IRA) and the National Council for the Accreditation of Teacher Education (NCATE); and (6) prepare students for the complexities they will face as reading specialists in schools serving the K-12 population.

Admission Requirements
Requirements listed here are in addition to general Graduate School requirements stated in the GENERAL INFORMATION section of the Graduate Bulletin.

For admission to the Graduate School, an applicant must hold either (1) a baccalaureate degree from a regionally accredited U.S. institution or (2) a tertiary (postsecondary) degree that is deemed comparable to a four-year bachelor's degree from a regionally accredited U.S. institution. This degree must be from an officially recognized degree-granting institution in the country in which it operates.

Admission
The M.Ed. Program in Literacy Education has five important admission requirements. First, students must have achieved an overall junior/senior grade point average of 3.00 or higher. For students applying for admission who have completed credits beyond the baccalaureate degree, we will evaluate the last (approximately) 60 credits completed. Second, students must submit two letters of recommendation. These letters must be from former professors or professionals who can attest to the academic ability and potential of the students. Third, students must submit a 200-300 word personal statement that addresses their career goals and reasons for pursuing a graduate degree. Fourth, students must have a valid Pennsylvania Teaching Certificate and present evidence that they have completed a course in the methods of teaching reading such as EDUC 320 (Methods in Teaching Beginning Readers) or 321 (Methods in Teaching Intermediate and Advanced Readers) with a grade of C or better. Fifth, students must submit test scores from one of the following: Graduate Record Examination, Miller Analogies Test, or Praxis examinations completed for certification.

The language of instruction at Penn State is English. All international applicants must take and submit scores for the TOEFL (Test of English as a Foreign Language) or the IELTS (International English Language
Testing System), with the exceptions noted below. The minimum acceptable score for the TOEFL is 550 for the paper-based test, or a total score of 80 with a 19 on the speaking section for the Internet-based test (iBT). The minimum acceptable composite score for IELTS is 6.5.

International applicants are exempt from the TOEFL/IELTS requirement who have received a baccalaureate or a graduate degree from a college/university/institution in any of the following: Australia, Belize, British Caribbean and British West Indies, Canada (except Quebec), England, Guyana, Republic of Ireland, Liberia, New Zealand, Northern Ireland, Scotland, the United States, and Wales.

Retention
Students must maintain a minimum 3.00 grade point average, satisfactorily complete all required key assessments, attain a grade of "C" or better in all required core courses. Students who do not make satisfactory progress will be notified in writing noting the specific deficiencies and requesting that they meet with the program coordinator to develop a remediation plan. Failure to meet or to satisfactorily complete the remediation plan will result in termination from the program.

All persons enrolled in Teacher Education Programs at Penn State Harrisburg are expected to demonstrate the professional dispositions that are aligned with the unit's vision statement. The faculty shall evaluate the approved dispositions demonstrated by the students in class and during field experiences. Students may be rated as exemplary, acceptable, or unacceptable. Students are expected to attain acceptable or exemplary ratings in order to graduate.

Degree Requirements
The Master of Education degree in Literacy Education consists of 42 credits that prepare students for the Pennsylvania Reading Specialist Certification (K-12). The degree requirements for the Master of Education in Literacy Education includes 36 credits in foundational, pedagogical, and advanced theoretical work in reading, writing and educational research design and a 6 credit capstone clinical practicum for a total of 42 credits. A minimum grade-point average of 3.00 for work done at the University and acceptable or higher ratings on the professional dispositions are required for graduation. Prescribed Core Course Requirements (39 Credits)

**EDUCATION (EDUC)**
422. Literature for Children and Adolescents (3)
425. Literacy Assessment (3)
452. Teaching Writing (3)
466. Foundations of Teaching English as a Second Language (3)
471. Best Practices in Literacy (3)
477. Teaching Struggling Readers and Writers (3)
561. Psychology of Reading (3)
562. Diagnostic Evaluation of Reading Problems (3)
563. Advanced Methods of Teaching Reading (3)
564. Reading Clinic (6)
565. Literacy Leadership (3)
586. Educational Research Designs (3)

Electives
(Choose 3 credits from the following)
Students can choose either one of two electives in the program. Both elective courses (ENGL 409 or EDUC 432) require specialized study in the teaching of writing. ENGL 409 (taken concurrently with EDUC 452) will allow the student to complete a writing fellowship with the Capital Area Writing Project. Or, EDUC 432 allows for the in-depth study of writing through children's literature.
ENGL 409 Composition Theory and Practice for Teachers (3)
EDUC 432 Children's Literature in the Writing Curriculum (3)

Transfer Credits
Subject to the limitations given below, a maximum of 10 credits of high-quality graduate work done at a regionally accredited institution may be applied toward the requirements for the master's degree. However, credits earned to complete a previous master's degree, whether at Penn State or elsewhere, may not be applied to a second master's degree program at Penn State. The student should distinguish carefully between the transferability of credit and its applicability in a particular degree program. Approval to apply any transferred credits toward a degree program must be granted by the student's academic adviser, the program head or graduate officer, and the Graduate School. Transferred academic work must have been completed within five years prior to the date of first degree registration at the Graduate School of Penn State, must be of at least B quality (grades of B- are not transferable), and must appear on an official graduate transcript of an accredited university. Pass-fail grades are not transferable to an advanced degree program unless the "Pass" can be substantiated by the former institution as having at least B quality.

A maximum of 15 graduate credits taken as a nondegree student prior to admission to a graduate degree program may be applied to a graduate program, with departmental approval. The credits must have been earned within five years preceding entry into the degree program. Forms for transfer of credit can be obtained from the graduate program office.

Courses
Graduate courses carry numbers from 500 to 599 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 courses below the 400 level in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Revised Bulletin Listing

Literacy Education (LEDUC)
The Program

The Master of Education in Literacy Education at Penn State Harrisburg is designed to provide full-time and part-time graduate students with a focused program of study in the field of literacy education. This advanced degree provides students with a comprehensive approach to literacy research, instructional practice, assessment, and leadership to meet the varied and diverse needs of preK-12 learners. Grounded in sociocultural and critical literacy approaches, the program affords literacy professionals: (1) specialized, in-depth knowledge about the teaching of literacy; (2) diagnostic and clinical skills necessary to support and plan instruction for a diverse range of students; (3) the ability to interpret, evaluate, and use literacy research to inform practice; (4) opportunities to use both digital and traditional texts to teach literacy across the curriculum; (5) knowledge about the role of social context in supporting preK-12 learners’ acquisition of language and literacy; and (6) the literacy leadership skills necessary to support and inform professional practice in preK-12 settings. Students also participate in a final capstone course that provides the opportunity to work closely with preK-12 learners in a faculty-supervised, clinical, or on-site setting. Throughout the program, students work closely with faculty and cultivate strong peer support networks.

The Literacy Education program is aligned with the Pennsylvania Department of Education (PDE), the International Reading Association (IRA), the National Council for Teachers of English (NCTE), and the Council for Accreditation of Educator Preparation (CAEP) (formerly known as NCATE) standards.

Following successful completion of the program, students are eligible to take the Praxis examination for certification as a Pennsylvania Reading Specialist (K-12). A Literacy Leadership certificate and fellowship opportunities in the National Writing Project (NWP) are also available.
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.

Students must have achieved an overall junior/senior grade point average of 3.00 or higher on a 4.0 scale. For students applying for admission who have completed credits beyond the baccalaureate degree, we will evaluate the last (approximately) 60 credits completed.

- Two letters of recommendation
- A brief (200-300 words) personal statement describing your interest in pursuing a master’s degree in Literacy Education
- A valid Pennsylvania Teaching Certificate*
- Test scores from one of the following: GRE, Miller Analogies Test, or Praxis examinations completed for certification

* Pennsylvania Teaching Certificate must be with an evidence of a course in the methods of teaching reading, such as EDUC 320 (Methods in Teaching Beginning Readers) or 321 (Methods in Teaching Intermediate and Advanced Readers) with a grade of C or better.

Retention
Students must maintain a minimum 3.00 grade-point average, satisfactorily complete all required key assessments, and attain a grade of "C" or better in all required core courses. Students who do not make satisfactory progress will be notified in writing noting the specific deficiencies and requesting that they meet with the program coordinator to develop a remediation plan. Failure to meet or to satisfactorily complete the remediation plan will result in termination from the program.

All persons enrolled in Teacher Education Programs at Penn State Harrisburg are expected to demonstrate the professional dispositions that are aligned with the unit’s vision statement. The faculty shall evaluate the approved dispositions demonstrated by the students in class and during field experiences. Students may be rated as exemplary, acceptable, or unacceptable. Students are expected to attain acceptable or exemplary ratings in order to graduate.

Degree Requirements

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

The Master of Education degree in Literacy Education consists of 33 credits that prepare students for the Pennsylvania Reading Specialist Certification (K-12). The degree requirements for the Master of Education in Literacy Education include 21 credits in foundational, pedagogical, and advanced theoretical work in reading, writing, and educational research design, two courses that make up the capstone clinical practicum (6 credits), and 6 additional credits of electives for a total of 33 credits. At
least 18 credits must be taken at the 500 or 800 level, with at least 6 credits at the 500 level. A minimum grade-point average of 3.00 for work done at the University and acceptable or higher ratings on the professional dispositions are required for graduation.

Courses

Prescribed Course Requirements (27 Credits):
EDUC 452. Teaching Writing (3)
EDUC 477. Teaching Struggling Readers and Writers (3)
LL ED 445 Teaching English in Bilingual/Dialectal Education (or an equivalent ELL course approved by the program coordinator) (3)
EDUC 561. Psychology of Reading (3)
EDUC 562. Diagnostic Evaluation of Reading Problems (3)
EDUC 563. Methods in Teaching Reading (3)
EDUC 564. Reading Clinic (3)
EDUC 565. Literacy and Leadership (3)
LL ED 594. Research in Language and Literacy Education (3)

Students must enroll in EDUC 563 and EDUC 564 consecutively in the fall and spring during the same academic year. These courses serve as the culminating experience for the degree. In these courses, students complete a case study inquiry project designed to address the needs of a literacy-learner, engage in professional development and mentorship, and present their research findings to peers. In EDUC 563, students engage in observation and design of their case study inquiry project. In EDUC 564, under the supervision of faculty, students collect data, implement change, analyze results, and present their findings to colleagues. Students engage in ongoing professional development and mentorship in both courses.

Electives (6 credits):
Students may choose to take EDUC 422 Literature for Children and Adolescents (3), EDUC 432: Children’s Literature in Teaching Writing (3), or EDUC 472: Teaching Reading through the Content Areas (3).

Transfer Credits
Penn State allows a maximum of 10 transfer credits of high-quality graduate work to be applied toward the requirements for a graduate degree, subject to restrictions outlined in the Transfer Courses section of the Graduate Bulletin.

A maximum of 15 graduate credits taken as a non-degree student prior to admission to a graduate degree program may be applied to a graduate program, with departmental approval. The credits must have been earned within five years preceding entry into the degree program.

Forms of transfer of credit can be obtained from the graduate program office.
Accreditation and Licensure

This program is accredited by the Council for Accreditation of Educator Preparation (CAEP), formerly known as the National Council for Accreditation of Teacher Education (NCATE), whose “performance-based system of accreditation fosters competent classroom teachers and other educators who work to improve the education of all P-12 students. CAEP believes every student deserves a caring, competent, and highly qualified teacher.”

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 courses below the 400-level in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

SECTION C: Consultation

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<th>Date</th>
<th>Response</th>
<th>Approved (Y/N)</th>
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<td>Anne Whitney, Program Coordinator of Language and Literacy Education</td>
<td>February 10, 2015</td>
<td>February 17, 2015</td>
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<td>Penn State York</td>
<td>Dennis Baughman, Program Coordinator of Teaching and Curriculum</td>
<td>February 10, 2015</td>
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<td>University Park</td>
<td>Patrick Shannon, Professor of Language and Literacy Education</td>
<td>March 17th, 2015</td>
<td>March 18th, 2015</td>
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Original Responses are attached.

SECTION D: SARI Requirements

SARI requirements in the Literacy Education M.Ed. will be met through the research course, LL ED 594.
Anne Whitney, Program Coordinator of Language and Literacy Emphasis, Penn State University Park

From: "Anne Whitney" <awhitney@psu.edu>
To: "LAURA ANN ROY" <lar37@psu.edu>
Sent: Tuesday, February 17, 2015 8:10:24 AM
Subject: Re: Proposal for Changes to Literacy Education Consultation

Laura, forgive me! I kept waiting for this proposal to appear in my Angel "My Course Submission and Consultation" space, and it didn't. I guess y'all are outside that system somehow.

I concur with these proposed changes. I am glad to see attention to ELLs/language diversity and to writing retained-- and better integrated into the rest of the program.

Let me know if you need more.

Anne Whitney

Anne Elrod Whitney, Ph.D.
Associate Professor of Education
Department of Curriculum and Instruction
Pennsylvania State University
166 Chambers Building
University Park, PA 16802
(814) 865-0528
awhitney@psu.edu
http://www.personal.psu.edu/alw17

On Feb 10, 2015, at 1:58 PM, LAURA ANN ROY wrote:

Dear Dr. Whitney,

This email is to formerly request your consultation on the proposed changes to the Literacy Education M.Ed. at Penn State Harrisburg. Attached, you will find a proposal outlining the following:

(A) Justification for Changes (B) Brief Summary of Changes, the Old Program Listing, and the New Program Listing (with track changes), (C) Consultation Chart, (D) SARI Requirements
The summary of changes are as follows:

Students in the Literacy Education M.Ed. are currently required to take 42 credits to graduate. The revised program will require 36 credits.

Changes to Required Courses

1. Two courses will be eliminated from required courses: EDUC 425 and EDUC 471
2. Two courses will be changed from required courses to electives: EDUC 422 and EDUC 432 and one additional course will be added as a possible elective*: EDUC 472
3. LLED 445 rather than EDUC 466 will be a required course. Students will still be able to take EDUC 466 with special permission from the Literacy Education Program Coordinator.

*Students will now choose to take 6 credits from the following courses: EDUC 422, EDUC 432, and EDUC 472

Course Key:
*EDUC 425. Literacy Assessment (3)
*EDUC 471. Best Practices in Literacy (3)
EDUC 452. Teaching Writing (3)
EDUC 477. Teaching Struggling Readers and Writers (3)
LL ED 445. Teaching English in Bilingual/Dialectal Education (or an equivalent ELL course approved by the program coordinator) (3)
*EDUC 466. Foundations of Teaching English as a Second Language (3)
EDUC 561. Psychology of Reading (3)
EDUC 562. Diagnostic Evaluation of Reading Problems (3)
EDUC 563. Advanced Methods of Teaching Reading (3)
EDUC 564. Reading Clinic (6)
EDUC 565. Literacy Leadership (3)
EDUC 586. Educational Research Designs (3)
EDUC 422: Literature for Children and Adolescents (3)
EDUC 432: Children’s Literature in Teaching Writing (3)
EDUC 472: Teaching Reading through the Content Areas (3)
* = Eliminated Courses

Based on your initial feedback, we choose allow for more elective options. This provides students the opportunity to take both EDUC 422 AND EDUC 432. This way, all students can take both the literature course and the children's literature in teaching writing course if they so choose.

Thank you for your feedback. Your consultation is greatly appreciated!

Best regards,
Good Afternoon Laura:

I am supporting the recommended changes for the Master of Literacy. This will be great news to the students wishing to pursue this degree.

Thanks,

Dennis

-----Original Message-----
From: LAURA ANN ROY [mailto:lar37@psu.edu]
Sent: Tuesday, February 10, 2015 2:00 PM
To: DENNIS PAUL BAUGHMAN
Subject: Proposal for Changes to the Literacy Education M.Ed. at PSH

Dear Dr. Baughman,

This email is to formerly request your consultation on the proposed changes to the Literacy Education M.Ed. at Penn State Harrisburg. Attached, you will find a proposal outlining the following:

(A) Justification for Changes (B) Brief Summary of Changes, the Old Program Listing, and the New Program Listing (with track changes), (C) Consultation Chart, (D) SARI Requirements

The summary of changes are as follows:

Students in the Literacy Education M.Ed. are currently required to take 42 credits to graduate. The revised program will require 36 credits. Changes to Required Courses

1. Two courses will be eliminated from required courses: EDUC 425 and EDUC 471
2. Two courses will be changed from required courses to electives: EDUC 422 and EDUC 432 and one additional course will be added as a possible elective*: EDUC 472

3. LLED 445 rather than EDUC 466 will be a required course. Students will still be able to take EDUC 466 with special permission from the Literacy Education Program Coordinator.

*Students will now choose to take 6 credits from the following courses: EDUC 422, EDUC 432, and EDUC 472

Course Key:
*EDUC 425. Literacy Assessment (3)
*EDUC 471. Best Practices in Literacy (3) EDUC 452. Teaching Writing (3)
EDUC 477. Teaching Struggling Readers and Writers (3) LL ED 445. Teaching English in Bilingual/Dialectal Education (or an equivalent ELL course approved by the program coordinator) (3) *EDUC 466. Foundations of Teaching English as a Second Language (3) EDUC 561. Psychology of Reading (3) EDUC 562. Diagnostic Evaluation of Reading Problems (3) EDUC 563. Advanced Methods of Teaching Reading (3) EDUC 564. Reading Clinic (6) EDUC 565. Literacy Leadership (3) EDUC 586. Educational Research Designs (3) EDUC 422: Literature for Children and Adolescents (3) EDUC 432: Children’s Literature in Teaching Writing (3) EDUC 472: Teaching Reading through the Content Areas (3)

* = Eliminated Courses

Thank you for your feedback. Your consultation is greatly appreciated!

Best regards,

Laura Roy
Laura A. Roy, Ph.D.
Assistant Professor and Program Coordinator of Literacy Education
The Pennsylvania State University, Harrisburg
lroy@psu.edu

--

Patrick Shannon, Professor of Language and Literacy, Penn State University Park

From: "PATRICK WILLARD SHANNON" <pxs15@psu.edu>
To: "LAURA ANN ROY" <lar37@psu.edu>
Sent: Wednesday, March 18, 2015 8:39:43 AM
Subject: Re: Proposal for Changes to Literacy Education M.Ed. at Harrisburg

Laura,

We're teachers. Borrowing is a excellent practice. Hope it works out well.
Pat

On Wed, Mar 18, 2015 08:16 AM, LAURA ANN ROY <lar37@psu.edu> wrote:

Hi Pat,
Thanks for responding so quickly! Previously, we offered EDUC 586 as a research course. This is a general research course that Teaching and Curriculum and Literacy students take. Unlike UP (and Great Valley), the Literacy Education M.Ed. is separate from the Teacher and Curriculum M.Ed.. When the Literacy Program was created at Penn State Harrisburg, the dream was to eventually offer a Language and Literacy research course to address teacher research and continuous data gathering and, at the same time, discuss research specific to the field of Literacy. The Reading Clinic serves as the capstone course for the degree (EDUC 563 and 564) rather than a master's paper. We re-imagined the clinic (it is currently offered much like the one at UP) to follow an academic year model whereby students engage in an inquiry project within their own school district. We've noticed in the past that our students aren't applying what they've learned in Reading Clinic to their classroom context - they can't see how the individualized instruction can translate to everyday teaching. So, we put our heads together and came up with a different model.

I like that UP offers a special education course, but we chose to address RTI in our Struggling Reader and Psychology of Reading courses. We do draw from multiple philosophical perspectives in those courses (although we definitely privilege sociocultural and critical perspectives in the overall program).

Thanks again for your input!
Laura

Laura A. Roy, Ph.D.
Assistant Professor and Program Coordinator of Literacy Education
The Pennsylvania State University, Harrisburg
lroy@psu.edu

From: "PATRICK WILLARD SHANNON" <pxs15@psu.edu>
To: "LAURA ANN ROY" <lar37@psu.edu>
Sent: Wednesday, March 18, 2015 7:56:47 AM
Subject: Re: Proposal for Changes to Literacy Education M.Ed. at Harrisburg

Laura,

The topics of the program seem sound to me. I am not familiar with the previous course content and am not certain about what will be spread among other offerings. Not sure that I can comment on the research class because I don't find a syllabus attached (with me that does mean that the isn't one attached; it means I'm incompetent!). Our CI 501 is about teacher research and the continuous need to gather data in order to make decisions. That course prepares our students for the master paper at the end of our program. Did I miss the culminating event of your program?

Our certification program is 30 credits and includes a special education course. That way we consider all levels of RTI with different philosophical possibilities.
Happy to talk more if that would help. Good luck with the curriculum committees.

Pat

On Tue, Mar 17, 2015 10:16 PM, LAURA ANN ROY <lar37@psu.edu> wrote:

Dear Pat,

I'm writing to seek your advice and consultation on a proposal we've been working on for the last year that would reduce the credits in our Literacy Education M.Ed. from 42 to 33. At Harrisburg, changes to existing programs are still proposed via paper/email rather than through ANGEL. I attached the proposal draft (using the prescribed format) to this email. You will see the current bulletin listing, a brief summary of proposed changes, the new/proposed bulletin listing (using Track Changes), and a rationale/justification for changes. I also included a summary of proposed changes below. I'm particularly interested in your thoughts regarding the research course.

Brief Summary of Changes
Students in the Literacy Education M.Ed. are currently required to take 42 credits to graduate. The revised program will require 33 credits.

Changes to Required Courses
1. Two courses will be eliminated from required courses: EDUC 425 and EDUC 471
2. Two courses will be changed from required courses to electives: EDUC 422 and EDUC 432 and one additional course will be added as a possible elective*: EDUC 472
3. LLED 445 rather than EDUC 466 will be a required course. Students may be able to take EDUC 466 with special permission from the Literacy Education Program Coordinator.
4. LLED 594 rather than EDUC 586 will be a required course.

*Students will now choose to take 6 credits from the following courses: EDUC 422, EDUC 432, and EDUC 472

Thanks for your help. I greatly value your input!

Laura

Laura A. Roy, Ph.D.
Assistant Professor and Program Coordinator of Literacy Education
The Pennsylvania State University, Harrisburg
lroy@psu.edu
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 Curriculum Coordinator, University Faculty Senate, 101 Kern Graduate Building, University Park. The proposals will be transmitted to the Office of the Dean of the Graduate School for entry into the Graduate Council curricular review process; 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: Agriculture Sciences
Department or Instructional Area: Plant Pathology and Environmental Microbiology

New Graduate Program, Option, or Minor: ☑ Add

Designation of new graduate program: DUAL-TITLE PHD IN PLANT PATHOLOGY AND BIOGEOCHEMISTRY
Classification of Instructional Programs (CIP) Code: 1.1199
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:
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):

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

Submitted by Graduate Program Head
Carolee T. Bull
Printed name
Signature
Date: 2/3/16

Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:
Robert D. Shannon
Printed name
Signature
Date: 3/1/16

Approved by College/School Dean/Chancellor (or Designee):
Gary A. Thompson
Printed name
Signature
Date: 3-4-16
<table>
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<th>Role</th>
<th>Printed name</th>
<th>Signature</th>
<th>Date</th>
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<tr>
<td>On behalf of Luis Ayala</td>
<td></td>
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<td>9/7/16</td>
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<td>Recommended by Chair, Graduate Council Subcommittee on New and Revised Programs and Courses:</td>
<td></td>
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<tr>
<td>On behalf of Andris Freivalds</td>
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<td>9/7/16</td>
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<td>Noted by Dean of the Graduate School:</td>
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<td>9/7/16</td>
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<tr>
<td>On behalf of Regina Vasilatos-Younken</td>
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<td>9/7/16</td>
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</tbody>
</table>
Proposal by the Plant Pathology Graduate Program to Offer Dual-Title Ph.D.
in Plant Pathology and Biogeochemistry

Submitted by
Carolee Bull, Professor and Head of Department
Plant Pathology and Environmental Microbiology
212 Buckhout Laboratory
University Park, PA 16802
ctb14@psu.edu
College of Agricultural Sciences
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PROGRAM PROPOSAL

The Graduate Program in Plant Pathology (PPATH) proposes a dual-title Ph.D. degree program in Biogeochemistry (BGC). The Department of Plant Pathology and Environmental Microbiology (PPEM) will function as a core partner in the Biogeochemistry Ph.D. degree program, which will expand the range of study and research options available to the program’s graduate students. The dual-title program is administered by the Department of Geosciences in the College of Earth and Mineral Sciences with the support of the Department of Ecosystem Sciences and Management in the College of Agricultural Sciences (CAS).

This dual-title degree will provide PPATH graduate students with the skills and knowledge necessary to conduct environmental microbiology research in an increasingly interdisciplinary science community responding to global change. In so doing, the dual-title PPATH/Biogeochemistry degree will expand the range of study and research options available to the department’s graduate students.

Environmental microbiology is an important component in the field of biogeochemistry, addressing environmental sustainability, ecosystem restoration, and global change. The dual-title PPATH/Biogeochemistry degree program will prepare students to work in an enhanced interdisciplinary context, having technical environmental microbiology skills as well as the means to convey technical information to the public, farmers, foresters, government agencies, and businesses.

As stipulated by Graduate Council Policy, this document will address in various places:

1. Program objectives and how the program strengthens existing programs of the college and University
2. New courses to be established as part of the new offering
3. Complete program statement
4. Statement of admission requirements
5. Justification for the program, including its projected size and impact on current course offering, faculty load, and faculty advising duties.
6. Accreditation
7. Consultation
PROGRAM OBJECTIVES

The objectives of the dual-title PPATH/Biogeochemistry Ph.D. program are to:

1. Prepare students to assume leadership roles and professional careers in interdisciplinary environmental research and consulting requiring state-of-the-art methodological training, as well as conceptual expertise in one or more of the following areas of research and education: environmental sustainability; natural resources and biodiversity conservation and management; ecosystem restoration; and agriculture and food security.

2. Provide dual-title degree graduates with enhanced opportunities for employment with government agencies, NGOs, research institutes, corporations, and universities around the world.

3. Meet the University’s strategic objective to foster multidisciplinarity by creating a dual-title degree doctoral program between Plant Pathology (PPATH) and Biogeochemistry.

Contributions of the Dual-Title Ph.D. to Student Achievement and College/University Programs

The program will yield multiple benefits to students, the Department of Plant Pathology and Environmental Microbiology, and the CAS.

1. Graduates will:
   - Be able to convey information about their area of specialization in Plant Pathology and Environmental Microbiology from an enhanced interdisciplinary perspective to address complex problems involving environmental quality, food security, and agricultural and environmental sustainability.
   - Enjoy a competitive advantage for jobs in both the public and private sectors having a multidisciplinary component. The combination of a PPATH degree and Biogeochemistry degree for graduate students will increase their attractiveness to a variety of federal research agencies, academic institutions, non-governmental organizations, research institutes, and corporations.
   - Have a foundational network of contacts in their field within academia and also in environmental science communities. This network will also increase access to research opportunities and internships.
   - Benefit from increased opportunities for publication in a growing field of professional journals and presentations to a wider field of professional organizations.

2. Plant Pathology graduates will have a wider array of skills and competencies needed to provide analysis critical to understand and develop successful strategies to improve agricultural and environmental sustainability.
3. The PPATH program will have a competitive advantage in seeking external funding and increased opportunities for faculty and graduates to form relationships with scientists in interdisciplinary research institutions.

4. The Department will be a leader in advancing the strategic plans of the CAS and Penn State University, which promote interdisciplinary collaborations.

Departments Affected: Statement of Non-Duplication
The program will duplicate no other graduate program at this University. This proposed dual-title degree program will not impact other graduate programs at this university and will affect only the Department of Plant Pathology and Environmental Microbiology and affiliates of Biogeochemistry.

PPATH Admission Requirements
For admission to the dual-title doctoral degree under this program, a student must first apply and be admitted to the Plant Pathology graduate program. Once accepted into that program, the student can then submit an application to the BIOGEOCHEMISTRY Academic Program Committee for the dual-title degree program. The application consists of a written personal statement indicating the career goals that a student hopes to accomplish by earning a dual-title Ph.D. degree in Plant Pathology and BIOGEOCHEMISTRY. Requirements listed here are in addition to requirements stated in the GENERAL INFORMATION section of the Graduate Bulletin.
JUSTIFICATION: Plant Pathology and Biogeochemistry

In 2013, the Department administering the Plant Pathology graduate program changed its title from “Plant Pathology (PPATH)” to “Plant Pathology and Environmental Microbiology (PPEM)” as part of the College of Agricultural Science’s reorganization. This title change reflects a disciplinary expansion from agricultural/horticultural plant disease to a multidisciplinary field addressing all types of microbes and their activities in natural and managed environments. The Department’s title change was timely, because some PPEM faculty now conduct research related to environmental microbiology, such as on biofilms, microbial systematics, microbes in extreme environments, and waste recycling systems. This title change also was appropriate because microbial ecology concepts and molecular biology tools applied in the broader field have become essential in the training of plant pathologists.

Since the 1980s, when Carl Woese pioneered the use of ribosomal RNA phylogeny to discover three domains of life, the field of Environmental Microbiology has advanced our understanding of the diversity and complexity of the microbial world. It is now recognized that the outcomes of host-pathogen interactions can be influenced strongly by associated microbial communities (plant, animal, and soil microbiomes) and their responses to environmental conditions. Biogeochemistry, or the study of interactions between life and its environment, is an important sub-discipline within Environmental Microbiology, addressing biological, chemical, and physical processes occurring at the interfaces between microbes and biotic and abiotic habitat components. By offering a dual-title Ph.D. in Plant Pathology and Biogeochemistry, the Plant Pathology graduate program will enable students to strengthen their credentials as environmental microbiologists and pursue diverse careers in an increasingly complex and multidisciplinary society.

Since 2008, Penn State has provided the opportunity for students to earn a dual-title Ph.D. in Biogeochemistry with one of several major graduate programs. To date, 25 students have graduated with the dual-title Ph.D. in Biogeochemistry and either Soil Science (6), Geosciences (14), Ecology (2), Environmental Engineering (2), and Biogeochemistry and Molecular Biology (1). The proposed dual-title degree program will contribute to the continued success of an active community of scientists engaged in biogeochemical research and graduate training at Penn State. Currently, 14%, 25%, and 7% of all Geosciences, Soil Science, and Ecology Ph.D. students, respectively, are enrolled in the Biogeochemistry dual-title program. Based on current enrollments, we would expect about four to five students in the PPATH program to enroll as dual-title degree students each year.

Multiple PPEM faculty currently engage in research areas that could attract, as well as benefit from, students with interests and skills in biogeochemistry. These areas typically entail research at multiple scales and include Aerobiology, Microbe-Host Interactions and Ecosystem Effects, Microbial Ecology, Forest Pathology, Microbial Genomics and Evolution, and Host Resistance and Crop Biotechnology. If the dual-title degree program is approved, we expect three to five PPEM professors to seek appointments as Biogeochemistry program faculty. This number makes up 15-25% of PPEM faculty and is based on current participation by faculty in other graduate programs (e.g., 23% and 44% of academic faculty in Geosciences and Soil Science, respectively. The dual-title Ph.D. program in PPATH/BGC would enhance graduate training by offering integrated mentoring and course work in biogeochemistry. It would empower students to cross the
disciplinary boundaries in vocabulary, technique, and scientific paradigm that challenge more traditionally trained scientists.

The Biogeochemistry dual-title degree program was proposed and approved in 2008, following the successful completion of an Integrative Graduate Education and Research Traineeship (IGERT) program funded by the National Science Foundation (1999-2006). This IGERT, called the Biogeochemical Research Initiative for Education (BRIE) program, was designed specifically to foster cross-disciplinary collaboration and training. During the NSF funding period, 48 grad students received support from BRIE and an additional 11 student affiliates and 29 faculty members actively participated. The establishment of the dual-title Ph.D. program in Biogeochemistry was a transformational outcome of NSF’s investment and demonstrated Penn State’s commitment to permanent institutional change to facilitate interdisciplinary graduate training.

The Department of Plant Pathology and Environmental Microbiology is dedicated to becoming an interdisciplinary leader in the integration of research, teaching, and outreach in the sciences of plant pathology and environmental microbiology focused on world food production. Therefore, the faculty of Plant Pathology and Environmental Microbiology recognize the need for a vision of excellence in interdisciplinary science and the commitment to priorities necessary to achieve our goal. For this reason the Department of Plant Pathology and Environmental Microbiology has initiated a plan to provide expanded opportunities to include biogeochemistry training in its graduate programming.

PROGRAM SIZE AND IMPACT ON CURRENT COURSE OFFERINGS

Faculty Load, and Faculty Advising Duties

As of January 2016, there were 28 graduate students enrolled in the graduate program in Plant Pathology. Each year approximately 20-30 students seek admissions to the Plant Pathology graduate program, and each year, more students are expressing interest in environmental microbiology programming. In addition, the science of Plant Pathology and our department in particular has a close association with agricultural biosecurity and studies of foreign invasive species. Thus, we have an obligation to educate our graduates with an enhanced interdisciplinary perspective and the BIOGEOCHEMISTRY program will be an effective way to accomplish this goal. Once approved, we believe interest and enrollment in the program will grow. It is anticipated that the program will have a minimal effect on current course offerings or faculty advising duties.

The PPATH program will advertise the availability of this dual-title degree as part of its graduate recruitment activities, in the Graduate Student Handbook, and on the Department’s website.

Costs

We acknowledge that students enrolled in the dual-title program in PPATH and BIOGEOCHEMISTRY may require additional semester(s) to complete the additional course work required by BIOGEOCHEMISTRY, although in most cases it is not anticipated that more than one
additional semester will be necessary. Where possible, students will be encouraged to substitute BIOGEOCHEMISTRY courses for other program required courses and graduate on time. Costs for the dual-title degree will change only where the dual-title degree adds semesters to the student’s course of study and for the study abroad. Where additional semesters are necessary, the adviser of the graduate student admitted to the dual-title degree program will, in consultation with the Department Head, attempt to provide funding for the graduate student. Additional funds to supplement study abroad can be provided through the Plant Pathology Graduate Travel Assistance Fund and through awards from the Tammen Endowment for International Plant Pathology. The Office of International Programs will assist students and advisers in identifying external funding opportunities and use its own resources for study abroad to the extent possible. In some cases, the student may be expected to fund portions of their study abroad experiences.

**ACCREDITATION**

There is no accreditation body or board for this proposed dual-title graduate degree program.
CONSULTATION

Written Evidence of Consultation with Related Programs

Due to the multiple programs that offer courses in the BGC curriculum table, correspondence was sent to the following affected programs discussing the proposed revisions and expected enrollment increases. This was done to be more efficient and to provide other programs with the entire context in which changes are being proposed.

Programs Consulted

- Geosciences (GEOSC)
- Soil Science (SOILS)
- Chemistry (CHEM)
- Microbiology (MICRB)
- Biochemistry and Molecular Biology (B MB)
- Biochemistry and Molecular Biology (BMMB)
- Materials Science (MATSE)
- Civil and Environmental Engineering (C E)
- Horticulture (HORT)
- Plant Biology (PLBIO)
- Meteorology (METEEO)
- Agronomy (AGRO)
- Forest Resources (FOR)
- Environmental Resource Management (ERM)
- Geography

Emails were sent by Carolyn Boring (on behalf of Drs. Carolee Bull and Mary Ann Bruns) on June 13, 2016, to either the respective Director of Graduate Studies or other listed point of contact for each program. The emails contained an introductory message and a briefing document tailored to each program which identified the specific changes that might affect each respective program including potential impacts on course enrollments. On July 5, Dr. Bruns sent reminder emails to individuals who had not responded, as well as to faculty teaching courses in the curriculum table. The introductory text and each briefing document are presented in Appendix B.

PPEM received responses from all of the contacted programs by the requested deadline (extended to July 8) except for Meteorology. The programs that did respond provided written acknowledgement of and feedback on the proposed changes. Appendix C contains a summary table of the responses and feedback. Appendix D provides the direct correspondence of responses and feedback.

Respondents from all programs either supported the proposal or indicated no concerns. One course (FOR 470) was pointed out as having full enrollments the last two times it was offered, but Dr. Elizabeth Boyer (faculty member in charge) indicated that one or two additional students should not be a problem.
Written Evidence of Consultation with the Office of Research Protections

The PPATH program already requires students to fulfill Penn State’s SARI requirements as part of their completion of PPATH 590. This course will not be removed or altered in any way as part of the addition of the Dual Title Ph.D. degree in Biogeochemistry. Therefore, no consultation was conducted with the Office of Research Protections for this proposal.
Introductory Message and Consultation Request Briefing Documents

Introductory message emailed on June 13, 2016

Greetings,

I am sending this email on behalf of Drs. Mary Ann Bruns (Faculty Coordinator, Biogeochemistry Dual Title PhD Program); Beth Gugino (Director of Graduate Studies in Plant Pathology [PPATH]); and Carol T. Bull. (Head of the Department of Plant Pathology and Environmental Microbiology [PPEM]). The PPATH graduate program, within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing the addition of a Biogeochemistry (BGC) Dual Title Degree option. The BGC Dual Title program is administered by the Department of Geosciences (College of Earth and Mineral Sciences) with support from the Department of Ecosystem Science and Management (College of Agricultural Sciences). Students electing this degree program first enroll in a participating program and apply to earn a degree with a dual title in the Ph.D., e.g., Ph.D. in (graduate program name) and Biogeochemistry.

The BGC Dual Title in the Ph.D. was approved in 2003 for seven participating programs: Geosciences (GEOSC); Materials Science (MSE); Chemistry (CHEM); Biochemistry, Microbiology, and Molecular Biology (BMMB); Soil Science (SOILS); Environmental Engineering (CE); and Intercollege Graduate Degree Program in Ecology (IGDPE). We are proposing that PPATH participate in this dual-title program. As part of the process, we kindly request your consultation and feedback regarding the proposed inclusion of courses and how they may or may not impact your program(s) and/or course(s). The specific changes relevant to your program(s) are described in the document attached to this email, along with a course enrollment impact table where appropriate.

We hope you will be able to look over the attached document and consult with any relevant members of your program in a timely manner. We kindly ask for an email response with any feedback you may have by July 1, 2016.

Thank you for your time.

If you have questions concerning this proposal, please contact Dr. Mary Ann Bruns, mvb10@psu.edu.

Thank you for your time.

Carol Boring
Graduate Program Coordinator
Plant Pathology and
Environmental Microbiology
210 Buckhout Laboratory
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Geosciences

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

Expected Impact on Course Enrollments
The expected impact on enrollments in the following individual courses is low. Since program establishment in 2006, total enrollment in the BGC Dual-Title Ph.D. has not exceeded 30 students, with an average of 4 BGC Dual Title PhDs awarded each year. Each dual-title student selects courses that are tailored to his or her interdisciplinary training and research needs. In addition to fulfilling requirements of the primary program in which the student is initially enrolled, each dual-title student must take 15 credits from at least three of the six categories of elective courses listed in Appendix A. No more than six credits can be taken from any one category. The two credits of GEOSC/SOILS/CE 536 (Topics in Biogeochemistry) can fulfill credits in any of the six categories. Also, it is permissible for BGC elective courses to fulfill simultaneously the credit requirements of the student’s primary and dual-title programs.

In any given semester, therefore, BGC-specific enrollment increases in the courses listed below are not expected to be more than 2-3 students. The impact assessments are made based on these anticipated enrollments and the space available as indicated by the most recent historical enrollment data.

*If any of the following courses are no longer (or infrequently) offered by your program, please inform us and we will remove them from our list. We have also been informed by the Graduate School that we cannot list provisional courses, which is why we are removing some previously listed 596 courses.

The following table lists courses that may be affected:

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<tr>
<th>Course Title and Name</th>
<th>Current Enrollment</th>
<th>Expected Impact</th>
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<tr>
<td>GEOSC 409W Geomicrobiology</td>
<td>14 of 24 in FA 14</td>
<td>Low</td>
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<tr>
<td>GEOSC 411 Marine Biogeochemistry</td>
<td>Not in Bulletin</td>
<td>Infrequent?</td>
</tr>
<tr>
<td>GEOSC 413W Techniques in Environmental Geochemistry</td>
<td>13 of 12 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>GEOSC 416 Stable and Radioactive Isotopes</td>
<td>6 of 24 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits in Semester</td>
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<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>GEOSC 419</td>
<td>Organic Geochemistry of Natural Waters and Sediments</td>
<td>18 of 20 in FA 13</td>
</tr>
<tr>
<td>GEOSC 452</td>
<td>Hydrogeology</td>
<td>31 of 37 in SP 15</td>
</tr>
<tr>
<td>GEOSC 502</td>
<td>Evolution of the Biosphere</td>
<td>6 of 15 in SP 12</td>
</tr>
<tr>
<td>GEOSC 518</td>
<td>Stable isotope geochemistry</td>
<td>15 of 18 in SP 15</td>
</tr>
<tr>
<td>GEOSC 522</td>
<td>Geochemistry of Aqueous Systems</td>
<td>5 of 30 in SP 15</td>
</tr>
<tr>
<td>GEOSC 533</td>
<td>Principles of Geochemistry</td>
<td>10 of 15 in SP 09</td>
</tr>
<tr>
<td>GEOSC 560</td>
<td>Kinetics of Geological Processes</td>
<td>8 of 15 in SP 14</td>
</tr>
<tr>
<td>GEOSC 561</td>
<td>Mathematical Modeling in the Geosciences</td>
<td>8 of 20 in SP 15</td>
</tr>
</tbody>
</table>
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Soil Science

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<tbody>
<tr>
<td>SOILS 403 Soil Morphology Practicum</td>
<td>13 of 35 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>SOILS 404 Urban Soils</td>
<td>23 of 37 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>SOILS 405 Hydropedology</td>
<td>4 of 7 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>SOILS 412W Soil Ecology</td>
<td>17 of 30 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>SOILS 416 Soil Genesis and Classification</td>
<td>8 of 37 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Page Range</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------------------------------</td>
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</tr>
<tr>
<td>SOILS 420</td>
<td>Remediation of Contaminated Soils</td>
<td>8 of 28 in FA 14</td>
</tr>
<tr>
<td>SOILS 502</td>
<td>Soil Properties and Functions</td>
<td>11 of 30 in FA 14</td>
</tr>
<tr>
<td>SOILS 504</td>
<td>Unsaturated Zone Hydrology and Chemical Transport</td>
<td>9 of 15 in SP 15</td>
</tr>
<tr>
<td>SOILS 507</td>
<td>Soil Physics</td>
<td>3 of 20 in SP 14</td>
</tr>
<tr>
<td>SOILS 512</td>
<td>Environmental Soil Microbiology</td>
<td>4 of 20 in SP 14</td>
</tr>
<tr>
<td>SOILS 513</td>
<td>Environmental Soil Chemistry</td>
<td>13 of 25 in SP 12</td>
</tr>
<tr>
<td>SOILS 516</td>
<td>Soil Genesis Field Trip</td>
<td>8 of 15 in SU 14</td>
</tr>
<tr>
<td>SOILS 519</td>
<td>Nature of Soil Minerals</td>
<td>5 of 10 in FA 13</td>
</tr>
<tr>
<td>SOILS 571</td>
<td>Ecosystem Nutrient Cycles</td>
<td>8 of 20 in FA 13</td>
</tr>
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Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
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<tr>
<td>CHEM 408 Computational Chemistry</td>
<td>21 of 24 in SP 14</td>
<td>Low</td>
</tr>
<tr>
<td>CHEM 450 Physical Chemistry-Thermodynamics</td>
<td>48 of 54 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>67 of 150 in FA 14</td>
<td></td>
</tr>
<tr>
<td>CHEM 452 Physical Chemistry-Quantum Chemistry</td>
<td>50 of 152 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>CHEM 476 Biological Chemistry</td>
<td>22 of 35 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>prereq CHEM 450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 448 Surface Chemistry</td>
<td>21 of 25 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>prereqs CHEM 450 and 452</td>
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</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Units in Session</td>
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<td>---------------------</td>
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</tr>
<tr>
<td>CHEM 476</td>
<td>Biological Chemistry</td>
<td>22 of 35 in FA 14</td>
</tr>
<tr>
<td>Prereq CHEM 450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 525/BMMB 525</td>
<td>Analytical Separations</td>
<td>11 of 30 in FA 14</td>
</tr>
<tr>
<td>CHEM 526</td>
<td>Spectroscopic Analysis</td>
<td>12 of 42 in FA 14</td>
</tr>
<tr>
<td>CHEM 538/BMMB 538</td>
<td>Spectroscopic Methods in Bioinorganic Chemistry</td>
<td>6 of 12 in FA 14</td>
</tr>
<tr>
<td>CHEM 540</td>
<td>Biophysical Chemistry</td>
<td>15 of 25 in FA 14</td>
</tr>
<tr>
<td>Prereq CHEM 450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 543/MATSE 543</td>
<td>Polymer Chemistry</td>
<td>0 of 12 in SP 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 of 12 in SP 13</td>
</tr>
<tr>
<td>CHEM 567</td>
<td>Molecular Spectroscopy</td>
<td>2 of 20 in SP 14</td>
</tr>
<tr>
<td>Prereq CHEM 565</td>
<td></td>
<td></td>
</tr>
</tbody>
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Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Microbiology; Biochemistry and Molecular Biology

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<tr>
<td>MICRB 401 Microbial Physiology and Structure</td>
<td>17 of 36 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>MICRB 413 Microbial Diversity</td>
<td>21 of 26 in FA 10</td>
<td>Low</td>
</tr>
<tr>
<td>MICRB 421W Laboratory of General &amp; Applied Microbiology, 3 credits, FA 13 93%,</td>
<td>28 of 30 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>MICRB 416 Microbial biotechnology Prereq B M B 442</td>
<td>7 of 15 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Grade</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>B M B 401</td>
<td>General Biochemistry</td>
<td>52 of 70 in SP 15</td>
</tr>
<tr>
<td></td>
<td>Equiv to CHEM 476, cannot get credit for both</td>
<td>124 of 146 in SP 15</td>
</tr>
<tr>
<td>B M B 445W</td>
<td>Laboratory in Molecular Genetics, Prereq B M B 442</td>
<td>12 of 24 in FA 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 of 24 in SP 15</td>
</tr>
<tr>
<td>B M B 428</td>
<td>Physical Chemistry with Biological Applications</td>
<td>58 of 80 in FA 14</td>
</tr>
<tr>
<td>B M B 442</td>
<td>Laboratory in Proteins, Nucleic Acids and Molecular Cloning</td>
<td>20 of 20 in SP 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22 of 22 in SP 15</td>
</tr>
<tr>
<td>B M B 474</td>
<td>Analytical Biochemistry</td>
<td>25 of 34 in SP 15</td>
</tr>
<tr>
<td></td>
<td>Prereq B M B 428</td>
<td></td>
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Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

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<tbody>
<tr>
<td>BMMB 521 Microbial Biology I</td>
<td>2 of 14 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>BMMB 531 Biomolecular Structure Prereq B M B 401</td>
<td>12 of 15 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>BMMB 538 Spectroscopic Methods in Bioinorganic Chemistry</td>
<td>2 of 5 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>BMMB 598I Biological Applications of Mass Spectrometry</td>
<td>Not listed</td>
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</tr>
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Programs that may be affected:
Materials Science and Engineering

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</table>
| MATSE 443 Introduction to the Materials Science of Polymers | 39 of 40 in SP 14  
52 of 100 in SP 13 | Low |
| MATSE 473 Polymeric Materials Synthesis  
Prereq MATSE 443 | 12 of 20 in SP 15 | Low |
| MATSE 543/CHEM 543 Polymer Chemistry | 4 of 30 in SP 13 | Low |
| MATSE 575 Functional Polymeric Materials | 10 of 18 in FA 14 | Low |
| MATSE 570 Catalytic Materials  
Prereq CHEM 452 | 3 of 6 in FA 14 | Low |
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
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<tr>
<td>C E 476 Solid and Hazardous Wastes</td>
<td>32 of 40 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>C E 479 Environmental Microbiology for Engineers</td>
<td>15 of 10 in FA 14 10 of 10 in FA 13</td>
<td>Request permission?</td>
</tr>
<tr>
<td>C E 475 Water Quality Chemistry</td>
<td>17 of 20 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>C E 570 Environmental Aquatic Chemistry</td>
<td>13 of 20 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>C E 572 Biological Treatment Processes</td>
<td>9 of 30 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>Prereq C E 475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C E 573 Environmental Organic Chemistry</td>
<td>6 of 20 in SP 14</td>
<td>Low</td>
</tr>
<tr>
<td>Prereq C E 475</td>
<td></td>
<td></td>
</tr>
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Programs that may be affected:
Horticulture

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<tr>
<td>HORT 402W Plant Nutrition</td>
<td>18 of 30 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>HORT 445 Plant Ecology</td>
<td>21 of 35 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>HORT 514 Modern Techniques and Concepts in Plant Ecophysiology</td>
<td>0 of 5 in SP 12, 1 of 5 in SP 11</td>
<td>Drop?</td>
</tr>
<tr>
<td>HORT 517 Ecology of Plant Roots</td>
<td>7 of 12 in FA 13</td>
<td>Low</td>
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Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Plant Biology

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<tr>
<td>PLBIO 512 Plant Resource Acquisition and Utilization</td>
<td>9 of 10 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>8 of 10 in FA 13</td>
<td></td>
</tr>
<tr>
<td>PLBIO 514 Modern Techniques and Concepts in Plant Ecophysiology</td>
<td>11 of 11 in SP 15</td>
<td>Request permission?</td>
</tr>
<tr>
<td></td>
<td>11 of 11 in SP 14</td>
<td></td>
</tr>
<tr>
<td>PLBIO 513 Integrative Plant Communication and Growth</td>
<td>9 of 10 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>8 of 10 in SP 14</td>
<td></td>
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Meteorology

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Expected Impact on Course Enrollments

The expected impact on enrollments in the following individual courses is low. Since program establishment in 2006, total enrollment in the BGC Dual-Title Ph.D. has not exceeded 30 students, with an average of 4 BGC Dual Title PhDs awarded each year. Each dual-title student selects courses that are tailored to his or her interdisciplinary training and research needs. In addition to fulfilling requirements of the primary program in which the student is initially enrolled, each dual-title student must take 15 credits from at least three of the six categories of elective courses listed in Appendix A. No more than six credits can be taken from any one category. The two credits of GEOSC/SOILS/CE 536 (Topics in Biogeochemistry) can fulfill credits in any of the six categories. Also, it is permissible for BGC elective courses to fulfill simultaneously the credit requirements of the student’s primary and dual-title programs.

In any given semester, therefore, BGC-specific enrollment increases in the courses listed below are not expected to be more than 2-3 students. The impact assessments are made based on these anticipated enrollments and the space available as indicated by the most recent historical enrollment data.

*If any of the following courses are no longer (or infrequently) offered by your program, please inform us and we will remove them from our list. We have also been informed by the Graduate School that we cannot list provisional courses, which is why we are removing some previously listed 596 courses.

The following table lists courses that may be affected:

<table>
<thead>
<tr>
<th>Course Title and Name</th>
<th>Current Enrollment</th>
<th>Expected Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 597A Global Carbon Cycle</td>
<td>Provisional course</td>
<td>Drop?</td>
</tr>
<tr>
<td>METEO 563 Bioclimatology</td>
<td>5 of 30 in SP 14</td>
<td>Low</td>
</tr>
<tr>
<td>METEO 532 Chemistry of the Atmosphere</td>
<td>6 of 40 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>METEO 523 Modeling the Atmospheric System</td>
<td>7 of 20 in SP 15</td>
<td>Low</td>
</tr>
</tbody>
</table>
**Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program**

*Programs that may be affected:*
Agronomy

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

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</thead>
<tbody>
<tr>
<td>AGRO 597B Models in Agricultural and Natural Systems</td>
<td>Provisional course</td>
<td>Drop?</td>
</tr>
<tr>
<td>AGRO 410W Physiology of Agricultural Crops</td>
<td>10 of 24 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>AGRO 510 Ecology of Agricultural Systems</td>
<td>9 of 14 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>AGRO 518 Responses of Crop Plants to Environmental Stress</td>
<td>4 of 8 in FA 13</td>
<td>Low</td>
</tr>
</tbody>
</table>
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Forest Resources

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

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<tbody>
<tr>
<td>FOR 470 Watershed Management</td>
<td>15 of 26 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>FOR 409 Tree Physiology (3 credits) SP 15 80%</td>
<td>12 of 15 in SP 15</td>
<td>Low</td>
</tr>
<tr>
<td>FOR 471 Forest Watershed Management Laboratory</td>
<td>5 of 15 in SP 14</td>
<td>Low</td>
</tr>
<tr>
<td>FOR 508 Forest Ecology</td>
<td>8 of 15 in SP 10</td>
<td>Low</td>
</tr>
</tbody>
</table>
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Plant Pathology and Plant Pathology and Environmental Microbiology

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

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<tbody>
<tr>
<td>PPEM 405 Microbe-Plant Interactions</td>
<td>10 of 12 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>PPEM 417 Phytobacteriology</td>
<td>8 of 20 in SP 14</td>
<td>Low</td>
</tr>
<tr>
<td>PPEM 425 Biology of Fungi</td>
<td>10 of 12 in FA 14</td>
<td>Low</td>
</tr>
<tr>
<td>PPEM 454 Virus Ecology</td>
<td>No enrollment data</td>
<td></td>
</tr>
<tr>
<td>PPATH 505 Fundamentals of Phytopathology</td>
<td>5 of 15 in SP 15</td>
<td>Low</td>
</tr>
</tbody>
</table>
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Environmental Resource Management

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

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<tbody>
<tr>
<td>E R M 444 Environmental Biophysics</td>
<td>10 of 10 in FA 14</td>
<td>Request permission?</td>
</tr>
</tbody>
</table>
Consultation Request to Include Elective Courses in PPATH/BGC Dual Title PhD Program

Programs that may be affected:
Geography

The Plant Pathology graduate program (PPATH) within the Department of Plant Pathology and Environmental Microbiology (PPEM), is proposing to offer a Dual-Title PhD in Biogeochemistry. The PPEM faculty kindly requests your input regarding elective courses in the Biogeochemistry Curriculum Table which may be chosen by students enrolled in the PPATH/BGC Dual Title Degree Program.

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</tr>
</thead>
<tbody>
<tr>
<td>GEOG 550 Wetland Ecology</td>
<td>Newly approved course</td>
<td>Low</td>
</tr>
</tbody>
</table>
Summary of Consultation Responses and Feedback

<table>
<thead>
<tr>
<th>NAME</th>
<th>DEPARTMENT</th>
<th>TITLE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICHAEL ALLAN ARTHUR</td>
<td>Earth &amp; Min. Sci</td>
<td>PROF OF GEOSCI</td>
<td>no response from this individual; but received response from another member of his department</td>
</tr>
<tr>
<td>PATRICK FOX</td>
<td>CIVIL ENGR</td>
<td>DEPT HEAD</td>
<td>no response from this individual; but received response from another member of this department</td>
</tr>
<tr>
<td>WILLIAM BURGOS</td>
<td>CIVIL ENGR</td>
<td>PROFESSOR</td>
<td>I have reviewed your proposal and strongly support it. Adding the BGC dual title to the Plant Pathology PhD degree will not impact either the graduate program in Environmental Engineering or the undergraduate program in Civil Engineering.</td>
</tr>
<tr>
<td>SUZANNE MOHNEY</td>
<td>MATSE</td>
<td>PROF</td>
<td>MATSE would not be adversely affected by the proposed change. Offered some course number changes for MATSE and updates.</td>
</tr>
<tr>
<td>ROBERT ALLEN KIMEL</td>
<td>MATSE</td>
<td>Assoc. Head</td>
<td>no response from this individual; but received response from another member of this department</td>
</tr>
<tr>
<td>ROBERT SHANNON</td>
<td>AG &amp; BIOL E R MENG</td>
<td>PROGRAM DIRECTOR</td>
<td>ERM program has no objections to the addition of the Biogeochemistry dual title degree option to the PPATH graduate program. The impact on the program and its courses will be minimal.</td>
</tr>
<tr>
<td>Jonathan Lynch</td>
<td>Plant Sci</td>
<td>PROF</td>
<td>The two HORT graduate courses listed are taught by Dave Eissenstat. These are co-listed with PLBIO and Dave has moved to ESM, so I am not sure they will remain HORT listings in future. Sounds like a great dual title program.</td>
</tr>
<tr>
<td>Richard Marini</td>
<td>Plant Sci</td>
<td>PROF</td>
<td>no response from this individual; but received response from another member of his department</td>
</tr>
<tr>
<td>Teh-Hui Kao</td>
<td>biochem &amp; molec biol</td>
<td></td>
<td>no response from this individual; but received response from another member of his department</td>
</tr>
<tr>
<td>Name</td>
<td>Department</td>
<td>Title</td>
<td>Response or Comment</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------</td>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Johnnes Verlinde</td>
<td>Metero</td>
<td>Assoc. Hd</td>
<td>no response</td>
</tr>
<tr>
<td>Alexander Klippel</td>
<td>Geog</td>
<td>Assoc Hd</td>
<td>no response, but received response from Robert Brooks, faculty member who teaches the GEOG course.</td>
</tr>
<tr>
<td>Stacey Englert/Mark Maroncelli</td>
<td>Chemistry</td>
<td>UG program Mgr/Disting. Prof of Chem</td>
<td>Proposal is fine - there will be minimal impact on our enrollments.</td>
</tr>
<tr>
<td>Hillary Dellapenta/Ken Feldman</td>
<td>Chemistry</td>
<td>Grad Program Mgr/Grad Program Chair</td>
<td>Wishes us good luck with your new program.</td>
</tr>
<tr>
<td>Jack Watson</td>
<td>Ecosystem Sci</td>
<td>Prof of Soil phys and Biogeochem</td>
<td>I strongly support this initiative and are pleased PPATH will be participating in the BGC Dual Degree option.</td>
</tr>
<tr>
<td>Michael Messina</td>
<td>Dept Ecosystem Sci &amp; Mgmt</td>
<td>Dept Head</td>
<td>I agree with the proposal. I will defer to the decision of my colleagues (Mary Ann Bruns) but I agree with the inclusion of those SOILS courses and the FOR 470.</td>
</tr>
<tr>
<td>Peter Heaney</td>
<td>Earth &amp; Min. Sci</td>
<td>Assoc Head UG</td>
<td>I have reviewed your proposal and support it. I do not anticipate that adding the BGC dual title to the Plant Pathology PhD degree will impact the undergraduate Geosciences program.</td>
</tr>
<tr>
<td>Ellen Manno</td>
<td>AG Sci</td>
<td>Instr Forest Res</td>
<td>I did receive the email but did not respond since it was about a graduate program matter and our grad program chair (Jack Watson) also received it. I am sending your request to Marc Abrams and Beth Boyer since their courses are on your list (FOR 409, 508, 470 471). I will point out that the snapshot of FOR 470 that you included on page 28 of the attachment is not representative of that course. Beth Boyer was on sabbatical in SP15 and offered the course by special arrangement to students who absolutely needed to take it that semester. The enrollment limit on FOR 470 is usually 70, and it is typically full every spring when it is offered. Also, FYI, FOR 409 is offered only in spring of odd years. And FOR 508 has not been offered since SP10 so it may not be a viable</td>
</tr>
</tbody>
</table>
selection for the proposed option -- but Marc Abrams can address that.

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Role</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meredith Defelice</td>
<td>biochem &amp; molec biol</td>
<td>Dir. Of Curr. Affairs</td>
<td>no response, but received response from the graduate program director in the BMMB dept.</td>
</tr>
<tr>
<td>Marc Abrams</td>
<td>Ag SCI</td>
<td>Prof</td>
<td>I have reviewed your proposal and have not identified any substantial problems with enrollment in the 400 and 500 level courses I teach (FOR 409 and 508).</td>
</tr>
<tr>
<td>Michael Jacobson</td>
<td>Ag Sci, Forest Resource</td>
<td>Prof</td>
<td>I have no concerns.</td>
</tr>
<tr>
<td>Paul Babitzke</td>
<td>BMMB</td>
<td>co-grad directors</td>
<td>The BMMB graduate program approves the addition of PPATH to the Biogeochemistry Dual Title Option. Please be aware that BMMB 521 Microbial Biology I has been modified and is called Current Research Topics in Microbiology (BMMB 598G); offered every other spring starting SP18.</td>
</tr>
<tr>
<td>David Eissenstat</td>
<td>Ecosystem Sci &amp; Mgmt</td>
<td>Prof.</td>
<td>I have no problem if Plant Path joins the BGC dual title.</td>
</tr>
<tr>
<td>Elizabeth Boyer</td>
<td>Ecosystem Sci &amp; Mgmt</td>
<td>Assoc Prof</td>
<td>I'm fully supportive of adding plant path and env microbio to the biogeo program and am confident that we could work out the accommodations for any interested in taking these courses as electives.</td>
</tr>
</tbody>
</table>
July 21 2016

Vicki L. Hewitt, Ed.D., Director of Graduate Education Administration
The Graduate School, Office of the Dean
210A Kern Graduate Building
The Pennsylvania State University

Dear Dr. Hewitt:

I am writing this letter on behalf of the executive committee and faculty of the Biogeochemistry Dual Title PhD Program. The BGC faculty support the proposal by the Plant Pathology graduate program to offer the dual title PhD degree in Plant Pathology/Biogeochemistry (PPATH/BGC). Incorporating PPATH faculty and courses will expand and strengthen BGC program offerings in environmental microbiology and plant-microbe interactions. Addition of PPATH would increase to eight the number of graduate programs participating in the BGC Dual Title, which now include Biochemistry and Molecular Biology, Chemistry, Civil and Environmental Engineering, Geosciences, Intercollege Ecology, Intercollege Materials Science and Engineering, and Soil Science.

We would welcome graduate students from the Department of Plant Pathology and Environmental Microbiology seeking breadth in biogeochemistry. In my role as Program Head, I have provided consultation support to the PPEM faculty. I understand that PPEM faculty support for the proposal has been unanimous. All responses I have received from the BGC faculty have been positive, and I can attest to their full support for this proposal. Please contact me if you have any questions.

Sincerely,

Mary Ann Bruns, Ph.D., Associate Professor
Department of Ecosystem Science and Management
Head, Biogeochemistry Dual-Title Ph.D. Program

cc: Carolee Bull, Head, Department of Plant Pathology and Environmental Microbiology
Hi Mary Ann,

If an email is adequate, then I have reviewed your proposal and support it. I do not anticipate that adding the BGC dual title to the Plant Pathology PhD degree will impact the undergraduate Geosciences program.

Best wishes,
Peter

Dr. Peter J. Heaney Professor of Mineral Sciences
Associate Head for Undergraduate Programs Emeritus
Dept. of Geosciences
540 Deike Building Penn State University
University Park, PA 16802

Phone: 814-865-6821
Fax: 814-863-7823
Dr. Jack Watson (Soil Science)

From: Jack Watson
To: Carolee Bull
Cc: Mary Ann Bruns, Beth K. Guzinc, Carolyn Boring
Subject: RE: consultation for Biogeochemistry (BGC) Dual Title Program
Date: Monday, June 13, 2016 4:25:12 PM

Dr. Bull,
I know this was a major effort to put together. Thank you for your perseverance!

I strongly support this initiative and are pleased PPATH will be participating in the BGC Dual Degree option!

***************************** Dr. Jack Watson
Professor of Soil Physics and Biogeochemistry
ESM Director of Graduate Studies
Ecosystem Science and Management Dept. 409
ASI Building
University Park, PA 16802
jackwatson@psu.edu
814-863-6714

Dr. Mike Messina (Ecosystem Science and Management)

From: Mike Messina
To: Carolyn Boring
Cc: Mary Ann Bruns
Subject: Re: consultation for Biogeochemistry (BGC) Dual Title Program
Date: Monday, June 13, 2016 3:38:26 PM

I will defer to the decision of my colleagues (Mary Ann Bruns) but I agree with the inclusion of those SOILS courses and the FOR 470.

I agree with the proposal.

MGM

--
Michael G. Messina, Head and Professor Department of Ecosystem Science and Management Penn State University
121 Forest Resources Building
University Park, PA 16802
Phone: 814-863-7093
FAX: 814-865-3725
mgm20@psu.edu
Good Morning,

Dr. Ken Feldman, our Graduate Program Chair, has looked over the attached document and wishes you good luck with your new program from the Chem. Dept.

Thanks so much,

Hilary

Hilary Dellapenta
Graduate Program Manager
Department of Chemistry
The Pennsylvania State University
104 Chemistry Building University Park, PA 16802 814.865.1383
Hi Carol,

Please see Dr. Maroncelli's comment below. Stacy

Stacy Englert

Undergraduate Program Manager
The Pennsylvania State University
Department of Chemistry
130 Davey Laboratory
University Park, PA 16802
814-863-8234

Stacy,

The proposal is fine as far as Chemistry is concerned. (There will be minimal impact on our enrollments.)

mpm

Professor Mark Maroncelli
Associate Head for Undergraduate Education in Chemistry Office: 408 Chemistry Building (mail 104 Chemistry)
Phone: (814)-865-0898
Web Site: http://maroncelliweb.chem.psu.edu
Dr. Paul Babitzke (Biochemistry and Molecular Biology)

From: Paul Babitzke <pxb28@psu.edu>
Date: Wednesday, July 6, 2016 at 9:04 AM
To: Carolee Bull <ctb14@psu.edu>
Cc: Dave Gilmour <dsg11@psu.edu>, Heather Giebink <hug14@psu.edu>, Linda Kunes <ljk4@psu.edu>, Lorraine Santy <lcs13@psu.edu>
Subject: Re: consultation for Biogeochemistry (BGC) Dual Title Program

Hi Carolee,

We did receive the memo and I forwarded it to all of the BMMB faculty for their comments. I requested that all comments or concerns be sent directly to Mary Ann Bruns. I don’t know whether anybody responded to Mary Ann but I did not find any concerns when I read through the proposal. However, you should be aware that BMMB 521 (Microbial Biology I) has been modified because of consistent under enrollment. The course is now 3 credits (rather than 4) and is called Current Research Topics in Microbiology (BMMB 598G). Furthermore, the course will only be offered every other Spring semester. The next time it will be offered will be Spring 2018. We hope that by adding PPATH the enrollment will increase.

The BMMB graduate program approves the addition of PPATH to the Biogeochemistry Dual Title Option.
Best,
Paul
Dear Carolyn and Carolee,

I see no reason that MATSE would be adversely affected by the proposed changes to the Biogeochemistry (BGC) Dual Title Program and provide some corrections and suggestions below:

The course MATSE/CHEM E 597 Surface Characterization now has a permanent course number. It is MATSE/CHEM E 510. Although it appears in the chart on page 4 as MATSE/CHEM E 597, it is missing altogether from the table in Appendix A.

Just in case they are of interest, I also point you towards 2 additional graduate courses in MATSE:

MATSE 507/BIOE 517: Biomaterials Surface Science (3): Special properties of surfaces as an important causative and mediating agent in the biological response to materials.

MATSE 508/BIOE 508: Biomedical Materials (3): Properties and methods of producing metallic, ceramic, and polymeric materials used for biomedical applications.

On page 3, please note that Materials Science (MSE) should read Materials Science and Engineering (MATSE). On page 7, please note that Materials Science (MATSE) should read Materials Science and Engineering (MATSE).

Thank you.

Suzanne

--
Suzanne Mohney
Professor of Materials Science and Engineering
Professor of Electrical Engineering
Chair of the Intercollege Graduate Degree Program in Materials Science and Engineering
Penn State University
N-209 Millennium Science Complex
University Park, PA 16802
E-mail: mohney@psu.edu
Office: (814) 863-0744
http://www.esm.psu.edu/mohney/
Hi Mary Ann,

I have reviewed your proposal and strongly support it. Adding the BGC dual title to the Plant Pathology PhD degree will not impact either the graduate program in Environmental Engineering or the undergraduate program in Civil Engineering.

Regards,

Bill

William D. Burgos
Professor of Environmental Engineering
Graduate Officer
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The Pennsylvania State University
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http://www.engr.psu.edu/ce/enve/burgos/new/
Program Chair-Elect ACS Geochemistry Division 2016
Hi Carolee,

the two HORT graduate courses listed are taught by Dave Eissenstat. These are colisted with PLBIO and Dave has moved to ESM, so I am not sure they will remain HORT listings in future.

I assume that Dave would welcome more students in these courses. (Dave if you wish to add anything please do so).

Furthermore the HORT and AGRO grad programs will hopefully merge in the near future so offerings are likely to change.

Please let me know if anything further is needed.

Sounds like a great dual title program.

kind regards

Jonathan

---

I have no problem if Plant Path joins the BGC dual title.
Mary Ann,

I did receive the June 13 e-mail but did not respond since it was about a graduate program matter and our grad program chair (Jack Watson) also received it.

By copy of this e-mail I am sending your request directly to Marc Abrams (FOR 409, FOR 508) and Beth Boyer (FOR 470, FOR 471) since their courses on on your list.

I will point out that the snapshot of FOR 470 that you included on page 28 of the attachment is not representative of that course. Beth Boyer was on sabbatical in SP15 and offered the course by special arrangement to students who absolutely needed to take it that semester. The enrollment limit on FOR 470 is usually 70, and it is typically full every spring when it is offered. Also, FYI, FOR 409 is offered only in spring of odd years. And FOR 508 has not been offered since SP10 so it may not be a viable selection for the proposed option -- but Marc Abrams can address that. Thanks.

Ellen A. Manno
Coordinator of Undergraduate Programs and Alumni Relations Penn State, Department of Ecosystem Science and Management 114 Forest Resources Building
University Park, PA 16802 (814) 863-0362 phone (814) 865-3725 fax exr2@psu.edu http://ecosystems.psu.edu

Hi Ellen et al. –

With regard to FOR 470 and FOR 471, I think this is fine. However, please note that FOR 470 is designed for undergrads of a wide array of backgrounds, we typically have few if any grads. I haven’t heard yet about the TA situation for FOR 470, but 2 are really needed to accommodate an enrollment in the course of ~70 as we’ve discussed previously. However, if we would end up limiting
enrollment in FOR 470 to 45-50 students to appropriately accommodate just 1 TA, I presume that we would give first priority to CAS students, instead denying enrollment to students in other majors outside of our college. There is precedent for this, as for example CAS students are not allowed to take popular water courses in ENGR during the fall or spring such as CE 360 (fluid mechanics), CE 370 (intro to environmental engineering), or CE 371 (water and wastewater treatment), unless they choose to pay to take such courses online only during the summer. The TA for FOR 470 also helps with the field trips for the associated FOR 471 course. Enrollment in the lab FOR 471 is always low and having more students would help. FOR 471 is typically offered only once every 2 years due to the low enrollments, and is alternated with a different special topics seminar in water sciences each year. We typically have more grads than undergrads in FOR 471 and its designed for both. I don’t expect enrollments in either of these courses to change much due to new grad students in the biogeo program. I’m fully supportive of adding plant path and env microbio to the biogeo program and am confident that we could work out the accommodations for any interested in taking these courses as electives.

Regards, Beth

Dr. Marc Abrams (Forest Resources)

From: MARC ABRAMS
To: Ellen Manno
Cc: Mary Ann Bruns; Michael Jacobson; Carolee Bull; Carolyn Boring; Beth Boyer
Subject: Re: response to course consultation request (FOR 409, FOR 508, FOR 470, FOR 471)
Date: Tuesday, July 05, 2016 2:17:52 PM

Mary Ann,
I have reviewed the proposal and have not identified any substantial problems with enrollment in the 400 and 500 level courses I teach (For 409 and 508).
Regards,
Marc Abrams

307 Forest Resource Building
Agricultural Sciences
Ecosystem Science & Management

From: MARC ABRAMS [mailto:agl@psu.edu]
Sent: Tuesday, July 05, 2016 2:28 PM
To: Mary Ann Bruns; exr2@psu.edu
Subject: RE: response to course consultation request (FOR 409, FOR 508, FOR 470, FOR 471)

Mary Ann,
For 508 will not be offered again until 2018, if at all due to low enrollment since 2010. It has been offered every over other (even) year. I expect to retire spring 2019 and not sure what will happen to the course after that. I doubt anyone else on the forestry faculty will pick it up unless they hire a new ecologist (unlikely I think). I'm not sure if you should list it has an elective for the proposed major.
Marc
Thanks Marc, I do think we should keep FOR 508 in the table for now. BGC students working in the Critical Zone Observatory could be interested in taking the course in 2018. Best, Mary Ann

Mary Ann Bruns, Ph.D.
Associate Professor of Soil Microbiology Dept.
of Ecosystem Science and Management 116
Ag Sciences & Industries Bldg
The Pennsylvania State University
University Park, PA 16802 Phone:
(814)863-0779
FAX: (814)863-7043
Website: http://ecosystems.psu.edu/directory/mvb10
Faculty Coordinator, Biogeochemistry Dual Title Ph.D. Program: http://www.biogeochemistry.psu.edu/

Dr. Michael Jacobson (Forest Resources)

From: mgj222@gmail.com [mailto:mgj222@gmail.com] On Behalf Of Michael Jacobson
Sent: Tuesday, July 05, 2016 2:49 PM
To: Mary Ann Bruns
Subject: Re: response to course consultation request (FOR 409. FOR 508, FOR 470, FOR 471)

Mary Ann,

Sounds like you just need Beth to agree. I have no concerns. Let me know otherwise how I can help.

Mike

Professor Forest Resource Agricultural Sciences
Ecosystem Science & Management
Hi Carol and Mary Ann,

The Environmental Resource Management (ERM) program has no objections to the addition of the Biogeochemistry dual title degree option to the PPATH graduate program. The impact on the program and its courses will be minimal.

Sincerely,
Rob
Shannon
ERM Program Coordinator

******************************************************************************
Robert D. Shannon, Ph.D.
Associate Professor and Coordinator,
Environmental Resource Management Program
119 Ag. Administration Bldg.
Penn State University, University Park, PA 16802
Email: rshannon@psu.edu, Phone: 814-865-6942
http://agsci.psu.edu/erm
******************************************************************************
Dr. Rob Brooks (Geography)

On Jun 24, 2016, at 5:15 PM, "Rob Brooks" <rpbrooks2@gmail.com> wrote:

Hi Mary Ann - Alex Klippel is the guy (klippel@psu.edu). Course is finally getting permanent # again, long story. Will be GEOG 550. Cheers, Rob

Sent from my iPhone

On Jun 24, 2016, at 3:51 PM, Mary Ann Bruns <mvb10@psu.edu> wrote:

Hi Rob, I'm head of the Biogeochemistry PhD Dual Title program and we would like to add your wetlands course to the BGC curriculum table of elective courses. Could you please tell me who the Director of Grad Programs is in Geography for the course consultation to be approved by the Grad School? Thanks! Mary Ann

Mary Ann Bruns
Associate Professor, Soil Microbiology
Dept of Ecosystem Science and Management
The Pennsylvania State University
University Park, PA 16802
Phone: 814 863 0779
http://ecosystems.psu.edu/directory/mvb10
Biogeochemistry

Program Home Page

MARY ANN BRUNS, Program Coordinator
116 ASI, Department of Ecosystem Science and Management
814-863-0779
mvb10@psu.edu

ANGELA PACKER, Administrative Assistant
507 Deike, Department of Geosciences
814-865-7394
amp13@psu.edu

Degree Conferred:

Students electing this degree program through participating programs earn a degree with a dual title in the Ph.D., e.g., Ph.D. in (graduate program name) and Biogeochemistry.

The following graduate programs offer dual degrees in Biogeochemistry: Biochemistry, Microbiology, and Molecular Biology; Chemistry; Ecology; Environmental Engineering; Geosciences; Materials Science and Engineering; Plant Pathology; and Soil Science.

The Graduate Faculty

The Program

The Biogeochemistry Dual-Title Degree Program is administered by the Department of Geosciences with support from the Department of Ecosystem Science and Management for the participating graduate programs. A program committee with representatives from participating departments maintains program definition, identifies courses appropriate to the program, and recommends policy and procedures for the program’s operation to the dean of the Graduate School and to the deans of the participating colleges. The dual-title degree program is offered through participating programs in the College of Earth and Mineral Sciences, College of Agricultural Sciences, College of Engineering, Eberly College of Science, and the Intercollege Graduate Degree Programs. The program enables students from several graduate programs to gain the perspectives, techniques, and methodologies of Biogeochemistry, while maintaining a close association with major program areas of study. For admission to pursue a dual-title degree under this program, a student must apply to (1) the Graduate School and (2) one of the participating major graduate programs; and then subsequently to (3) the Biogeochemistry program committee. Students may only apply to the dual-title program once they have been accepted into a major program. Once a student has been accepted to a major program, application to the dual-title degree program can occur immediately or at a later time, such as
upon matriculation. The application to the dual-title degree program, however, must be accepted before the candidacy examination in the major program is scheduled.

Admission Requirements

Graduate students with research and educational interests in biogeochemistry may apply to the Biogeochemistry Dual-Title Degree Program. Candidates must submit transcripts of their undergraduate and graduate course work, a written personal statement indicating their interests in the interdisciplinary arena of Biogeochemistry and their career goals they hope to serve by attaining a Biogeochemistry dual-title, and a statement of support from their dissertation adviser, if assigned. A strong undergraduate preparation in the basic sciences is expected, with evidence of an interest in multiple disciplines.

Degree Requirements

To qualify for a dual-title degree, students must satisfy the requirements of the major graduate program in which they are enrolled, in addition to the minimum requirements of the Biogeochemistry program. Students are required to have two advisers from separate disciplines: one individual serving as a primary adviser in their major degree program (i.e., Soil Science, BMMB, Material Science & Engineering, Chemistry, Ecology, Environmental Engineering Geosciences, or Plant Pathology), and a secondary adviser in an area within a field covered by the dual-title program who is a member of the Biogeochemistry graduate faculty. The major program adviser normally will also be a member of the Biogeochemistry graduate faculty. The two faculty advisers can represent different academic programs, but this is not required, as faculty from a scientifically diverse department could represent very different areas of expertise.

To fulfill the course requirements for the dual-title in Biogeochemistry, students must complete a total of 15 graduate credits chosen in consultation with the adviser from an approved list of courses in the areas of biochemistry and microbiology, environmental chemistry, environmental engineering, geochemistry, materials science and engineering, and soil science.

All students must pass a candidacy examination that includes an assessment of their potential in the field of biogeochemistry. In all cases, the result of a single candidacy exam for both entrance to the student's major Ph.D. program and this dual-title program will be reported to the Graduate School. The candidacy examination committee must include at least one member of the Biogeochemistry Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. Because students must first be admitted to a graduate major program of study before they may apply to and be considered for admission into a dual-title graduate degree program, 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.

The student’s doctoral committee must include at least one member of the Biogeochemistry Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may serve in a combined role. If the chair of the committee representing the student’s major
degree program is not also a member of the Graduate Faculty in Biogeochemistry, the member of
the committee representing Biogeochemistry must be appointed as co-chair. The field of
Biogeochemistry must be integrated into the comprehensive examination.

A Ph.D. dissertation that contributes fundamentally to the field of Biogeochemistry is required.
A public oral presentation of the dissertation is required, which may be part of the final defense
within the major degree program.

Ph.D. candidates must complete a dissertation on a topic that contributes fundamentally to the
fields of both the student’s major degree program and Biogeochemistry. In order to earn the
dual-title Ph.D. degree, 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).

**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](#). A limited number of Research Assistantships are also available through the Biogeochemistry Dual-Title Degree Program.

Last Revised by the Program: July 2016

Blue Sheet Item #: 36-06-185

Review Date: 4/15/08

Faculty linked: 5/27/14
Plant Pathology and Environmental Microbiology (PPATH)

Program Home Page

Carolee Bull, Head, Plant Pathology and Environmental Microbiology
212 Buckhout Laboratory
814-865-7448

Degrees Conferred:

Ph.D., M.S.
Dual-title Ph.D. in Biogeochemistry
Dual-title Ph.D. and M.S. in International Agriculture and Development

The Graduate Faculty

- David M. Beyer, Ph.D. (Penn State) Professor of Plant Pathology
- Carolee T. Bull, Ph.D. (Oregon State University) Department Head, Professor of Plant Pathology and Bacterial Systematics
- Barbara J. Christ, Ph.D. (University of British Columbia) Senior Associate Dean; Professor of Plant Pathology
- Donald D. Davis, Ph.D. (Penn State) Professor of Plant Pathology
- David M. Geiser, Ph.D. (University of Georgia) Professor of Plant Pathology
- Beth K. Gugino, Ph.D. (Penn State) Associate Professor of Plant Pathology
- Scott A. Isard, Ph.D. (Indiana University) Professor of Aerobiology
- Maria del Mar Jimenez Gasco, Ph.D. (University of Cordoba, Spain) Associate Professor of Plant Pathology
- Seogchan Kang, Ph.D. (University of Wisconsin) Professor of Plant Pathology
- Gretchen A. Kuldau, Ph.D. (University of California-Berkeley) Associate Professor of Plant Pathology
- Timothy W. McNellis, Ph.D. (Yale University) Associate Professor of Plant Pathology
- John Pecchia, Ph.D. (Penn State) Assistant Professor of Plant Pathology
- Kari A. Peter, Ph.D. (Cornell University) Assistant Professor of Plant Pathology
- Marilyn Roossinck, Ph.D. (Colorado School of Medicine) Professor of Plant Pathology and Biology
- Cristina Rosa, PhD. (University of California-Davis) Assistant Professor of Plant Pathology
- Wakar Uddin, Ph.D. (University of Georgia) Professor of Plant Pathology
- Yinong Yang, Ph.D. (University of Florida) Associate Professor of Plant Pathology

The Program
Plant pathology is the study of disease in plants and concerns the dynamic interaction between the plant, the causal agent (bacteria, fungi, viruses, nematodes, etc.), and their environments. A student prepares for a professional career in research, teaching, extension, or industry through advanced studies of the principles of plant infection, the physiology of disease in plants, the ecology of root diseases, the nature and inheritance of disease resistance in plants, epidemiology, ecology and physiology of air pollution injury to plants, or plant disease control by biological or chemical means. A student may specialize in the nature and control of diseases of forest trees, agronomic or horticultural crops, and commercial mushrooms. Advanced studies in molecular systematics of fungi and applied mycology, related to the production of the commercial mushroom, are also available. Modern, well-equipped laboratories, controlled environment facilities and greenhouses, and well-developed field research areas are available for graduate study.

Admission Requirements

Requirements listed here are in addition to general Graduate School 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.

Scores from the Graduate Record Examinations (GRE) or from a comparable substitute examination accepted by a graduate program and authorized by the dean of the Graduate School, are required for admission. At the discretion of the program, a student may be admitted for graduate study in the program without these scores.

Students scoring in the fiftieth percentile or above on each section of the GRE will be given preference. The best-qualified applicants will be accepted up to the number of spaces and advisers that are available for new students. Students with a 3.00 junior/senior average (on a 4.00 scale) and with appropriate course backgrounds will be considered for admission. Exceptions to the minimum 3.00 grade-point average may be made at the program’s discretion for students with special backgrounds, abilities, and interests.

Students are expected to have a strong foundation in biological and physical sciences. Generally, students with B.S. degrees in biology, microbiology, plant science, molecular biology, or biochemistry are well prepared for graduate study in Plant Pathology.

Degree Requirements

M.S. DEGREE

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

The Master of Science degree program in Plant Pathology leads students either to the development of special proficiencies in Plant Pathology, which will allow the individual to directly enter a professional career, or to the development of a basic knowledge of the discipline, allowing for advancement to the Ph.D. degree. M.S. degree students will be introduced to the
broad aspects of the field of plant pathology, including exposure to the various causal agents of plant disease and the diseases they incite; diseases of current and classical importance affecting a wide range of crop plants; a variety of techniques used to isolate, characterize, and identify causal agents of plant disease; and an appreciation for the relationship between plant pathology and other biological and physical sciences.

A minimum of 31 credits at the 400 level or higher is required, with at least 18 credits in the 500 and 600 series combined. Required courses for the M.S. Degree are: PPEM 405 (3), PPEM 416 (3), PPEM 417 (3), PPEM 425 (4), PPATH 502 (3), PPATH 522 (1), and PPATH 590 (2)*. Students are required to take a minimum of 6 additional credits at the 500 level in Plant Pathology courses from a list provided by the department. A minimum of 6 thesis research credits (600 or 610) must be taken in Plant Pathology. Students may complete additional coursework at other levels as required and/or approved by their committee.

*All students are required to register for and participate in PPATH 590 (1 credit Pass/Fail) for all semesters enrolled. No more than two (2) credits of PPATH 590 may count towards the Master’s degree.

All Master degree students must write a thesis. The thesis must be accepted by the adviser(s), committee members, the head of the graduate program, and the Graduate School. The student must present and pass a thesis defense.

**Ph.D. DEGREE**

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

Candidates for the Ph.D. degree in Plant Pathology are required to have an M.S. in plant pathology or a closely related field, or equivalent educational background. In addition, all students must enroll in PPATH 505 (2) and other courses tailored to the individual by the candidate’s doctoral committee. Ph.D. candidates must prepare a dissertation and present seminars in the departmental colloquium (PPATH 590), which will evaluate English communication skills. During their studies, Ph.D. students will have an opportunity to assist in teaching a disciplinary subject.

All doctoral students must pass a candidacy examination, a comprehensive written and oral examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral students must also write a dissertation that is accepted by the doctoral committee, the head of the graduate program, and the Graduate School.

**Dual-Title Ph.D. Degree in Plant Pathology (PPATH) and Biogeochemistry**

Doctoral students with research and educational experiences in plant pathology and environmental microbiology may apply to the Plant Pathology/Biogeochemistry Dual-Title Doctoral Degree Program. The goal of the dual-title Ph.D. degree in Plant Pathology and Biogeochemistry is to enable PPATH graduate students to acquire the knowledge and skills of
their major area of specialization in PPATH, while at the same time gaining expertise and skills in biogeochemistry. Graduate study in this program seeks to provide students with the intellectual foundation for integrated and mechanistic understanding of interactions between plant hosts, microbes, and environmental systems. Interdisciplinary training that includes biogeochemistry will prepare students for positions in academia, government, non-profit organizations, and the private sector. It will also prepare students for a wide array of research careers in the private sector, including agricultural and environmental sciences, energy industries, and the integrated study of the sustainability of biological systems.

Admission Requirements

For admission to the dual-title doctoral degree in Biogeochemistry, a student must first apply and be admitted to the Plant Pathology graduate program and The Graduate School, preferably but not necessarily discussing the dual-title interest beforehand with a major adviser who has been appointed to the Biogeochemistry program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the Biogeochemistry dual-title program. Refer to the Admission Requirements section of the Biogeochemistry Bulletin page. Doctoral students must apply for enrollment into the dual-title degree program in Biogeochemistry prior to obtaining candidacy in their home department.

Degree Requirements

To qualify for the dual-title degree, students must satisfy the Plant Pathology Ph.D. degree requirements, listed above. In addition, students pursuing the dual-title Ph.D. in Plant Pathology and Biogeochemistry must complete the degree requirements for the dual-title Biogeochemistry Ph.D., listed on the Biogeochemistry Bulletin page. Students are required to have two advisers from separate disciplines: one individual serving as a primary adviser in their major degree program and a secondary adviser in an area within a field covered by the dual-title program who is a member of the Biogeochemistry graduate faculty. The major program adviser normally will also be a member of the Biogeochemistry graduate faculty. The two faculty advisers can represent different academic programs, but this is not required, as faculty from a scientifically diverse department could represent very different areas of expertise.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Plant Pathology and must include at least one Graduate Faculty member from the Biogeochemistry 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 Plant Pathology and Biogeochemistry. 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 a Plant Pathology and Biogeochemistry dual-title doctoral degree student must include at least one member of the Biogeochemistry 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 Biogeochemistry, the member of the committee representing Biogeochemistry must be appointed as co-chair. The Biogeochemistry 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 reflects their original research and education in Plant Pathology and Biogeochemistry. 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 in Plant Pathology (PPATH) and International Agriculture and Development (INTAD)**

Graduate students with research and educational interests in international education may apply to the Plant Pathology/INTAD Dual-Title Degree Program. The goal of the dual-title degree Plant Pathology and INTAD graduate program will enable graduate students to acquire the knowledge and skills of their primary area of specialization in Plant Pathology, while at the same time gain the perspective and methods needed for work in international agriculture. Graduate study in this program seeks to prepare students to assume leadership roles in science, science education, outreach, and project management anywhere in the world. Students are required to write research proposals and grants to support their research activities, reflecting the dual-title degree. As part of their professional development presentations, publication of research articles and active participation in professional societies is expected. Emphasis is placed upon the professional development of the student. Students are able to specialize in the research program areas of plant-microbe interactions, plant disease biology and epidemiology, environmental microbiology, mycology, plant virology, mushroom biology, genomics and disease management. They will acquire a broad perspective on applying their research findings in the context of the broader international community. The dual-title will allow students to master their field of specialization from an international perspective allowing them to compare practices and outcomes between countries and regions.

**Admission Requirements**

Students must apply and be admitted to the graduate program in Plant Pathology 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 INTAD dual-title program. Refer to the Admission Requirements section of the INTAD Bulletin page. Doctoral students must apply for enrollment into the dual-title degree program in INTAD prior to obtaining candidacy in their home department.

**Degree Requirements**

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Plant Pathology, listed above. In addition, students pursuing the dual-title in
Plant Pathology and INTAD must complete the degree requirements for the dual-title in INTAD, listed on the INTAD Bulletin page.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Plant Pathology and must include at least one Graduate Faculty member from the INTAD 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 Plant Pathology and INTAD. 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 a Plant Pathology and INTAD dual-title doctoral degree student must include at least one member of the INTAD 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 INTAD, the member of the committee representing INTAD must be appointed as co-chair. The INTAD 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 reflects their original research and education in Plant Pathology and INTAD. 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.

- [Plant Pathology course list](#)
- [INTAD course list](#)