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.

July 5, 2017

Graduate Degree Programs

ADD

Civil Engineering – new residential graduate program offering the M.S. degree (Penn State Harrisburg), page 5

Mechanical Engineering – new residential graduate program offering the M.S. degree (Penn State Harrisburg), page 43

CHANGE

Agronomy – adopt the dual-title in International Agriculture and Development for the Ph.D. and M.S. degrees (College of Agricultural Sciences), page 82

International Affairs – change degree requirements and confirm joint degree with Penn State Law (School of International Affairs), page 102

Graduate Courses

ADD

ACCTG 895
Internship
INTERNSHIP (1-6/Repeatable Max: 6)
Supervised, professionally oriented, off-campus, nongroup instruction, including field experiences, practicums, or internships.
PROPOSED START: FA2017

AEREC 512
Applied Microeconomic Theory I
MICROECONOMICS I (3)
Principles of microeconomic theory and models that Economists use to explain the behavior of consumers, firms, and markets, and how those principles may be applied to real-world problems.
Principles and models are developed using calculus. The emphasis is on applied theory and problem solving, rather than formal proofs and derivations.

PROPOSED START: FA2017

**ANTH 508**
Visualizing Anthropological Data
VISUAL ANTH DATA (3)
Anthropology is a four-field discipline comprising dozens of sub-disciplines, each one characterized by particular theoretical and methodological approaches. As a consequence, the data that anthropologists regularly collect, analyze, and display are diverse in nature, scale and complexity. The purpose of this course is to expose anthropology graduate students to the field's wide range of approaches for managing and visualizing anthropological data. Course content will focus on ways of organizing, analyzing, and representing anthropological datasets. Lectures, practicums, and discussion will center on the criteria and rationale behind visual representations and how these are related to research questions, hypotheses, models, and goals.

PROPOSED START: FA2017

**BA 513**
Advanced Microeconomic Analysis for Business
ADV MICROECON BUS (3)
This course discusses topics in advanced microeconomic analysis with an emphasis on applications to applied research areas in business and other related disciplines. Topics include (but are not limited to) general equilibrium, choice under uncertainty, game theory, mechanism design, and behavioral economics. An area of particular focus is how incomplete and asymmetric information impacts competitive and strategic behavior by individuals and firms in a variety of applied settings. The materials emphasize theoretical models prevalent in microeconomic research, and students are expected to develop a familiarity with the use of mathematical modeling in economics. Whenever possible applications to related applied disciplines such as those in finance, supply chain management, accounting, and agricultural economics will be highlighted and discussed. Experimental methods will be used at times to motivate and discuss various economic principles.

PROPOSED START: FA2017

**CI 511**
Educational Ethnography: History, Theory, and Methods
EDUC ETHNOGRAPHY (3)
This seminar shows students how to use ethnographic methods for education research to inform classroom practice and education policy. The course is centered around the idea that school communities serve as key sites for students of all ages to learn to become members of their culture(s). Course readings include historical to contemporary works of researchers who have shaped educational ethnography. We will also read about education in various settings and discuss anthropological explanations of inequities experienced by minority culture communities or marginalized groups. Students will carry out a mini-ethnographic study based on their area of research interest. The course is especially designed for students to be able to conduct ethnographic studies or make use of ethnographic techniques in future research projects.
CROSS-LISTED: CIED 511(ED)
CONCURRENTS: CI 502; ADTED 550; EDTHP 586
HIED 501  
Foundations of Higher Education  
FOUNDATIONS HIED (3)  
This course intends to explore what might be called the landscape of U.S. higher education. Acknowledging that a majority of the program’s students enter the doctoral program from a wide variety of disciplines and fields, this course is intended to give students an overview of past and current research in four overarching areas of inquiry that a majority of higher education researchers pursue. The four organizing themes are: foundations of higher education; college students; administration and organization in higher education; and, equity and diversity in higher education. Students will recognize that these four themes also intentionally correspond to the four areas in which they eventually must demonstrate competency (i.e., analytical comprehension and significance of the research). In examining the research in each of these four arenas of inquiry, students will consider various perspectives that higher education researchers commonly utilize including economic, historical, sociological, cultural, and legal perspectives.

HIED 502  
Diversity & Equity in Higher Education  
DIVERSITY & EQUITY (3)  
This course focuses on foundational and current issues related to equity and diversity in higher education. This course is organized into three major areas and levels of analysis: (1) an understanding of inequality and the framing of equity; (2) the diversity frame; and (3) strategies for transformation. The course will explore the concept of equity from different theoretical perspectives and an understanding of inequality from a structural, organizational, and individual level. In the second part, the course will explore what the diversity frame is, what its limitations are, and its relation to legal developments and affirmative action. The third part will focus on action, with specific strategies for transformational change toward greater equity and meaningful diversity and inclusion in higher education. Various types of equity and diversity will be considered, but special attention will be given to the complexity of race.

PHS 595B  
Biostatistics Internship  
BIOST INTERNSHIP (1-18/Repeatable Max: 18)  
Supervised, research-oriented, off-campus, nongroup instruction, including field experiences, practicums, or internships.

PSY 548  
Fundamentals of Cognitive Development  
FUND COGNITIVE DEV (3)  
Fundamentals of Cognitive Development will provide students with a broad background in theories, methods, and empirical findings in cognitive development. Discussions will address cognitive development across the lifespan, although empirical work will emphasize cognitive development during infancy, childhood, and adolescence. Students will study varied theoretical frameworks and methods, and will obtain experience in evaluating research from different theoretical perspectives, considering
the role of diverse contexts and individuals, and addressing implications of research for applied issues such as education.

PROPOSED START: FA2017

CHANGE

OLD
SWENG 537
Software System Design
SOFTWARE SYS DSGN (3)
Best practices in the requirements, analysis, and design of large software systems including the Unified Modeling language and the Unified Process.
EFFECTIVE START: SP2008

NEW
SWENG 837
Software System Design
SOFTWARE SYS DSGN (3)
The application of engineering best practices to the requirements, analysis and design of large software-centric systems will be presented. This will include the state of the art in software modeling techniques, the Unified Modeling Language and the Unified Process, along with tried and tested structured approaches. Students will learn how to analyze customer requirements and then systematically develop complete software specifications to meet those requirements using appropriate techniques for the application domain.
PROPOSED START: FA2017

OLD
SWENG 500
Software Engineering Studio
SW ENG STUDIO (3)
The 500-level studio provides an opportunity for students to undertake a substantial software project.
EFFECTIVE START: SU1999

NEW
SWENG 894
Capstone Experience
CAPSTONE EXPERIENCE (1-18: Repeatable Max: 18)
Supervised, professionally oriented student activities that constitute the culminating experience for the program.
PROPOSED START: FA2017
Graduate Council
Program, Option, or Minor Proposal Form

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

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

| College/School: Penn State Harrisburg |
| Department or Instructional Area: School of Science, Engineering, and Technology |

| New Graduate Program, Option, or Minor: Add |
| Designation of new graduate program: Master of Science in Civil Engineering |
| 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: |
| 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

| Name: Rolf A. Bachnak, Ph.D., P.E. |
| Signature: |
| Date: 2/16/17 |

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

| Name: Janet Duck |
| Signature: |
| Date: 3/6/17 |

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

<p>| Name: |
| Signature: |
| Date: March 3, 2017 |</p>
<table>
<thead>
<tr>
<th><strong>Recommended by Chair, Graduate Council Subcommittee on New and Revised Programs and Courses:</strong></th>
<th></th>
<th>Date: 01/23/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Behalf of John Challis</td>
<td>Velociraptian</td>
<td>Signature</td>
</tr>
<tr>
<td>Printed name</td>
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</tr>
</tbody>
</table>

**Recommended by Chair, Graduate Council Committee on Programs and Courses:**

| On Behalf of M. Kathleen Heid                                                                       | Velociraptian                                         | Date: 01/23/2017 |
| Printed name                                                                                      |                                                      |                  |

**Noted by Dean of the Graduate School:**

| On Behalf of Regina Vasilatos-Younken                                                                | Velociraptian                                         | Date: 01/23/2017 |
| Printed name                                                                                      |                                                      |                  |
Proposal for a
Master of Science in Civil Engineering
Degree Program

School of Science, Engineering, and Technology
Penn State Harrisburg
Revised June 2, 2017
A. JUSTIFICATION FOR THE PROGRAM

Harrisburg is the state capital of Pennsylvania and is home to many of the state agencies responsible for infrastructure in the state. The proximity to the state capital and the state agencies has led many large civil engineering firms to establish their headquarters or active branch offices in the central Pennsylvania area. These employers, state and private, have hired our undergraduate students and have supported their students who wanted to attend Penn State Harrisburg to receive advanced degrees in engineering science, environmental engineering, and engineering management/business. What we have not been able to offer these firms is a graduate degree in Civil Engineering, with courses in structural design, transportation, and water resources. With the proposed changes to engineering licensure, where engineers may have the equivalent of 150 college-credit hours of coursework to be eligible to sit for a Professional Engineering license, Penn State Harrisburg is uniquely situated to offer a degree that will ensure that engineers are qualified for licensure when the regulations change (anticipated change is approximately 2020).

Currently, the School of Science, Engineering, and Technology offers a certificate in Structural Design and an M. Eng. in Environmental Engineering. For students who are interested in completing a civil engineering master’s and not interested in the pollution treatment focus of the environmental engineering degree, Penn State Harrisburg does not have a viable option for them. This degree will address that need and will allow our bright, young graduates from our ABET-accredited undergraduate civil engineering degree to continue their education on their path to practice and licensure.

It is anticipated that the student population for this degree will be a mixture of full-time and part-time students. These students want the opportunity to study a problem in depth, hence the selection of the M.S. degree, which incorporates the research component that is desired. It is expected that the new program will enable the graduate faculty to attract research funds to support students and the college, increase the College research revenue, as well as enhance the reputation and competitiveness of SSET graduate programs. This degree will offer students the opportunity to complete a research project that enhances the technical knowledge of the profession through their 6-credit thesis. We anticipate enrollment in the M.S. CE program will reach 20 within the first two years of the program, based on the interest expressed by potential students at the graduate open houses.

Penn State Harrisburg (Capital College) currently offers 22 master's degrees and three doctoral programs. The School of Science, Engineering, and Technology (SSET) offers master's programs in Computer Science (M.S.), Electrical Engineering (M.S. and M.Eng.), Engineering Management (M.P.S.), Engineering Science (M.Eng.), Environmental Engineering (M.Eng.), and Environmental Pollution Control (M.S. EPC and M.E.P.C.)

A market study for the viability of the program is included in Appendix A. Also, letters
from industry representatives in Penn State Harrisburg's service region, including our Graduate Technical Advisory Council (GTAC) and employers of our BS CE and BS SDCET degrees are enclosed in Appendix B.

B. OBJECTIVES

The M.S. CE degree program at Penn State Harrisburg will provide students with an educational foundation that prepares them for leadership roles in civil engineering research and design. Students will receive in-depth scientific knowledge regarding their specific field of civil engineering, and exposure to modern analytical techniques that will enable them to formulate engineering problems and perform analysis and synthesis to determine answers. These skills are necessary in the successful practice of civil engineering.

Students will learn to read, interpret, and critically assess literature in specialized fields of civil engineering, and then conceive, develop, and conduct original research leading to useful applications in structural, transportation, and water-resources engineering. Attainment of these learning objectives will be measured by the successful completion of all degree requirements, including prescribed courses and electives, preparation of a master's thesis, and final oral defense of the thesis. Additionally, students will be mentored to prepare research proposals, technical reports, conference proceedings, and peer-reviewed journal articles, plus present their research at local, regional and national conferences.

C. NEW COURSES

No new courses will be required for the M.S. CE degree program. The complete set of civil engineering graduate courses to support the proposed program is available on the University bulletin list of graduate courses. Many of these courses are already offered at Penn State Harrisburg as part of the civil engineering focus area in the M Eng Program in Engineering Science and/or in the M Eng in Environmental Engineering and they will be incorporated into the M.S. CE program. Elective courses are also available outside of the CE program through the computer science, environmental engineering, engineering management, and engineering science graduate programs.

D. PROGRAM STATEMENT

Penn State Harrisburg (PSH) is ideally situated in the urban region within short commute of York, Lancaster, Carlisle, Reading and Harrisburg, where many large civil engineering firms are located. These firms focus on structural design, transportation design, and water-resources engineering. The Master of Science in Civil Engineering degree program is designed to provide support for these firms and their employees who want to enhance their design skills and update their knowledge above the level taught at the undergraduate level.
This program also will support changes in the professional licensure for civil engineers, if they occur. One current proposal would require that, in order to receive the designation of professional engineer, the applicant must complete the equivalent of a master’s degree in the field (bachelor’s degree + 30 credit equivalents). The belief of the American Society of Civil Engineers is that the bachelor’s degree does not provide sufficient in-depth study of the theory and application of civil engineering deserving of professional licensure. While these changes to professional licensure have been strongly supported by the professional societies, they have not yet been adopted by state licensure boards, so the implementation date is unknown. Establishing a M.S. in Civil Engineering in southcentral Pennsylvania, and specifically in the capital region, will ensure that Penn State Harrisburg is on the forefront of delivering this advanced education when it is required.

The program is accessible to engineering professionals who wish to pursue advanced studies without giving up current employment. The program may be completed on a full-time or part-time basis. Classes are scheduled weekly in three-hour evening sessions, offering a convenient format for career professionals seeking to enroll on a part-time basis. Whenever possible, the program will take advantage of the specialized equipment and facilities available in the local firms to enhance the training of M.S. CE program students.

1. **Degree Requirements**

The M.S. CE program at PSH is structured to take full advantage of the specialty areas of expertise of the CE graduate faculty. The program requires 31 credits, including 24 course credits with at least 12 credits at the 500 level, one colloquium credit (CE 590), and six thesis credits (600-level) as shown in Table 1. M.S. CE students are required to take an advanced math or statistics course (EMCH 524A or STAT 500). Then students will take 12 credits of civil engineering courses, selected from offerings in structural, transportation, and water resources, with nine (9) credit hours being taken at the 500-level. Students will take nine (9) additional elective credits at either the 400- or 500-level. These electives may be taken from civil engineering courses or courses offered by other departments that meet the objective of the M.S. CE degree. Table 2 presents a list of courses that will support the program. Students can work with their adviser to select courses that either focus on a specific area of civil engineering or that provide a robust in-depth background of multiple areas of civil engineering. A maximum of four 400-level courses (12 credits) may be taken for the M.S. CE degree.

Original research, usually requiring at least two semesters of work, is expected for a thesis (up to 6 credits). The work should be an in-depth investigation intended to extend the state of knowledge in a specialty area. The thesis must conform to the requirements of the Graduate School. A maximum of three credits of independent study (CE 596) may be applied towards the M.S. CE degree program, but the undergraduate individual study course (CE 496) will not count towards program credit requirements. A three-year course scheduling plan for the M.S. CE degree program is presented in Table 3.
Table 1. Outline of the Proposed M.S. CE Program

<table>
<thead>
<tr>
<th>Program Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Math/Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 500 or EMCH 524A</td>
<td>3.0</td>
</tr>
<tr>
<td>Civil Engineering Courses</td>
<td></td>
</tr>
<tr>
<td>Four civil engineering courses selected by students based on their interest. MINIMUM of 9 credits at the 500-level.</td>
<td>12.0</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td>400- or 500-level courses selected based on interest. See course list below.</td>
<td>9.0</td>
</tr>
<tr>
<td>CE Colloquium</td>
<td>CE 590</td>
</tr>
<tr>
<td>Research – Thesis</td>
<td>CE 600</td>
</tr>
<tr>
<td>Total Credits:</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Course List

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>COURSE TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 LEVEL COURSES (MAY NOT BE REPEATED FOR GRADUATE CREDIT IF TAKEN IN SUPPORT OF AN UNDERGRADUATE DEGREE; NO MORE THAN 12 CREDITS ALLOWED)</td>
<td></td>
</tr>
<tr>
<td>CE 421</td>
<td>Transportation Design</td>
</tr>
<tr>
<td>CE 422</td>
<td>Transportation Planning</td>
</tr>
<tr>
<td>CE 423</td>
<td>Traffic Operations</td>
</tr>
<tr>
<td>CE 432</td>
<td>Construction Project Management</td>
</tr>
<tr>
<td>CE 435</td>
<td>Foundation Engineering</td>
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<tr>
<td>CE 436</td>
<td>Construction Engineering Materials</td>
</tr>
<tr>
<td>CE 441</td>
<td>Structural Design of Foundations</td>
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<tr>
<td>CE 447</td>
<td>Structural Analysis by Matrix Methods</td>
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<tr>
<td>CE 449</td>
<td>Advanced Structural Design</td>
</tr>
<tr>
<td>CE 462</td>
<td>Open Channel Hydraulics</td>
</tr>
<tr>
<td>CE 475</td>
<td>Water Quality Chemistry</td>
</tr>
<tr>
<td>E MCH 400</td>
<td>Advanced Strength of Materials and Design</td>
</tr>
<tr>
<td>ENVE 417</td>
<td>Hydraulic Design</td>
</tr>
<tr>
<td>500 LEVEL CIVIL ENGINEERING COURSES</td>
<td></td>
</tr>
<tr>
<td>CE 512</td>
<td>Soil Mechanics II</td>
</tr>
<tr>
<td>CE 513</td>
<td>Advanced Foundation Engineering</td>
</tr>
<tr>
<td>CE 523</td>
<td>Analysis of Transportation Demand</td>
</tr>
<tr>
<td>CE 541</td>
<td>Structural Analysis</td>
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<tr>
<td>CE 543</td>
<td>Prestressed Concrete Behavior and Design</td>
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<tr>
<td>CE 544</td>
<td>Design of Reinforced Concrete Structures</td>
</tr>
<tr>
<td>CE 548</td>
<td>Structural Design for Dynamic Loads</td>
</tr>
<tr>
<td>CE 549</td>
<td>Bridge Engineering I</td>
</tr>
<tr>
<td>CE 550</td>
<td>Engineering Construction Management</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>COURSE TITLE</td>
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<td>--------------------------------------------------</td>
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<tr>
<td>CE 555</td>
<td>Groundwater Hydrology: Analysis and Modeling</td>
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<td>CE 561</td>
<td>Surface Hydrology</td>
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<tr>
<td>CE 570</td>
<td>Aquatic Chemistry</td>
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<tr>
<td>CE 581</td>
<td>Pavement Management and Rehabilitation</td>
</tr>
<tr>
<td>CE 582</td>
<td>Pavement Design and Analysis</td>
</tr>
<tr>
<td>CE 583</td>
<td>Bituminous Materials and Mixtures</td>
</tr>
<tr>
<td>CE 584</td>
<td>Concrete Materials and Properties</td>
</tr>
<tr>
<td>ENVE 550</td>
<td>Chemical Fate and Transport</td>
</tr>
<tr>
<td>EMCH 524A</td>
<td>Mathematical Methods in Engineering</td>
</tr>
<tr>
<td>STAT 500</td>
<td>Applied Statistics</td>
</tr>
</tbody>
</table>

Note: Electives may also be chosen from 500-level offerings in Engineering, Mathematics, Statistics, or Computer Science with Department Pre-Approval.

Table 3: Tentative Three-year Course Offering Plan

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>Fa Yr 1</th>
<th>Sp Yr 1</th>
<th>Fa Yr 2</th>
<th>Sp Yr 2</th>
<th>Fa Yr 3</th>
<th>Sp Yr 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently offered 400-level courses the M.S. CE students may choose from</td>
<td>CE 422</td>
<td>CE 421</td>
<td>CE 422</td>
<td>CE 421</td>
<td>CE 422</td>
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<td>CE 423</td>
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<td>CE 435</td>
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<td></td>
<td>CE 475</td>
<td>EMCH 400</td>
<td>CE 462</td>
<td>EMCH 400</td>
<td>CE 449</td>
<td>EMCH 400</td>
</tr>
<tr>
<td></td>
<td>ENVE 417</td>
<td>ENVE 415</td>
<td>CE 475</td>
<td>ENVE 415</td>
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<td></td>
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<td>ENVE 417</td>
<td>ENVE 417</td>
<td>ENVE 417</td>
<td>ENVE 417</td>
<td>ENVE 417</td>
</tr>
<tr>
<td>Currently offered 500-level courses that M.S. CE students may choose from</td>
<td>ENVE 550</td>
<td>CE 570</td>
<td>EMCH 524A</td>
<td>CE 555</td>
<td>EMCH 524A</td>
<td>CE 570</td>
</tr>
<tr>
<td></td>
<td>EMCH 524A</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>New 500/600-level course offerings</td>
<td>CE 544</td>
<td>CE 513</td>
<td>CE 543</td>
<td>CE 549</td>
<td>CE 548</td>
<td>CE 523</td>
</tr>
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<td></td>
<td>CE 584</td>
<td>CE 523</td>
<td>CE 561</td>
<td>CE 583</td>
<td>CE 582</td>
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<td></td>
<td>CE 590</td>
<td>STAT 500</td>
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During the first year of enrollment, graduate students will be required to complete an online Responsible Conduct of Research (RCR) training program. This is part of the SARI (Scholarship and Research Integrity) program at Penn State which is designed to offer graduate students comprehensive, multilevel training in the responsible conduct of research. The Office for Research Protections (ORP) will provide the conduit to this training via the SARI Resource Portal on the ORP website (www.research.psu.edu/orp/sari/).

Graduate students will also be required to engage in an additional 5 hours of discussion-based
RCR education prior to degree completion. This may be set up as an integral part of the graduate colloquium.

All students are expected to complete one credit of colloquium (CE 590) during the first two semesters of study. Degree requirements must be completed during a six-year period.

Students who have deficiencies in the use of spoken or written English may be required to take speech and writing classes in addition to the usual degree requirements. These courses may not be applied to the requirements for the degree.

2. **Supervision and Advising**

The M.S. CE Program Coordinator will select an interim (temporary) academic adviser for the student at the beginning of the first semester. It is the responsibility of the M.S. student to consult with possible research supervisors and to work with the academic adviser and selected research supervisor in developing a plan of study during the first semester of enrollment in the M.S. CE program. The research supervisor may suggest and approve 500-level courses from other departments to be included in the M.S. program. The student and adviser will also identify other faculty members who will serve on the student's research committee. By the end of the second semester, the student should complete the committee membership approval form, requesting the approval of the student's committee and tentatively identifying the research topic.

3. **Thesis Requirement**

Original research, requiring at least two semesters of work (at least 6 credits), is expected for a thesis. The work should be an in-depth investigation intended to extend the state of knowledge in some specialty area. Format requirements for the contents of the thesis are available in the Thesis Guide from the web page at http://www.gradsch.psu.edu/cunent/thesis.html. Committee members may request periodic progress reports which may contain materials that will appear in the thesis. When work is satisfactorily completed, the grade of 'R' will be assigned for C E 600 credits.

4. **Committee Specifications**

A student's M.S. Committee must have at least three members, two of whom must be Civil Engineering program Graduate Faculty. The committee chair or one of the co-chairs (in case of having two co-chairs) must be an engineering Graduate Faculty. The Committee may have additional members who are appointed to the Graduate Faculty at large or who have a professorial appointment in the Civil Engineering program area or in a department related to the research topic. This Committee must be appointed by the end of the third semester.
Two weeks prior to the thesis defense, the completed thesis should be delivered to the Committee members and a defense date must be scheduled with the department's graduate program staff assistant, who will provide assistance with the room reservation and publicity for the public presentation. All Committee members must attend the defense. After the defense and completion of the thesis all members of the Committee and the Program Coordinator will sign the signature page of the approved thesis. These individuals will also sign a thesis completion report to be placed in the student's file. The student will provide copies of the approved thesis to all Committee members, as requested, and to The Graduate School, as required.

5. Time Limits

The CE program has established a six-year time limit for completion of the M.S. degree. Any extension beyond six years requires the approval of the CE Graduate Faculty.

6. GPA Requirement

The student must maintain a minimum grade point average (GPA) of 3.00 or better on a 4.00 scale in 400- and 500-level courses listed on his/her Plan of Study.

7. University Bulletin: Graduate Degree Programs Copy

Civil Engineering  
School of Science, Engineering, and Technology  
Penn State Harrisburg - W-236 Olmsted Building  
777 West Harrisburg Pike, Middletown, PA 17057  
(717) 948-6127

Degree Conferred:  
M.S.

The Civil Engineering Graduate Faculty  
Joseph J. Cecere, Ph.D. (UNIVERSITY OF NORTH TEXAS), Associate Professor of Engineering  
Yen-Chih (David) Chen, Ph.D. (PURDUE UNIVERSITY WEST LAFAYETTE), Associate Professor of Environment Engineering  
Yohchia Chen, Ph.D. (UNIVERSITY OF MINNESOTA MINNEAPOLIS), Professor of Civil Engineering  
Shirley E. Clark, Ph.D. (UNIVERSITY OF ALABAMA), Associate Professor of Environmental Engineering  
Sai P. Kakuturu, Ph.D. (KANSAS STATE UNIVERSITY), Associate Professor of Civil Engineering
Seroj Mackertich, Ph.D. (PENNSYLVANIA STATE UNIVERSITY), Associate Professor of Engineering
Shashidhara Marikunte, Ph.D. (MICHIGAN STATE UNIVERSITY), Senior Lecturer of Civil Engineering
Sofia M. Vidalis, Ph.D. (UNIVERSITY OF FLORIDA), Associate Professor in Civil Engineering
Yuefeng Xie, Ph.D. (TSHINGHUA UNIVERSITY (BEIJING)), Professor of Environmental Engineering
The Program
Civil Engineering

Penn State Harrisburg (PSH) is located within a short commute from York, Lancaster, Carlisle, Reading, and Harrisburg, where many large civil engineering firms are located. These firms focus on structural design, construction management, transportation design, treatment plant design, and water-resources engineering. The Master of Science in Civil Engineering degree program is designed to provide support for these firms and their employees who want to enhance their design skills and update their knowledge above the level taught at the undergraduate level. This program also will support changes in the professional licensure for civil engineers, if they occur.

The program is accessible to engineering professionals who wish to pursue advanced studies without giving up current employment. The program may be completed on a full-time or part-time basis. Classes are scheduled weekly in three-hour evening sessions, offering a convenient format for career professionals seeking to enroll on part-time basis. Whenever possible, the program will take advantage of the specialized equipment and facilities available in the local firms to enhance the training of M.S. CE program students.

Admission Requirements
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.

Admission into the Master of Science (M.S.) Civil Engineering program will be granted only to candidates who demonstrate high potential for success in graduate studies. Applicants should have undergraduate degrees in engineering or technology-related fields from an accredited university and must meet the admission requirements as set by Penn State's Graduate School. An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale, and scores from the GRE are required for admission.

Applicants should submit the following:
- a completed Graduate School online application with the application fee;
- official transcripts from all post-secondary institutions attended;
- three (3) letters of professional recommendations from individuals who can evaluate the applicant's potential;
- a personal statement of professional interest, goals, and experience;
- test scores from the Graduate Record Examination (GRE); and
- a statement of interest in a graduate assistantship, if desired (full-time study required).

English Proficiency
The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. Consult the English Proficiency
Degree Requirements
Requirements listed here are in addition to requirements stated in the DEGREE REQUIREMENTS section of the Graduate Bulletin.

All graduate students in Civil Engineering are required to adhere to the requirements of the Graduate School, as found in the Graduate Degree Programs Bulletin. The requirements of the Graduate School, however, are minimum requirements and the policies, procedures, and regulations listed below are additional and more specific for graduate students pursuing the M.S. in Civil Engineering degree. Advisers will call pertinent regulations to the attention of their advisees, but it should be understood that it is the student's personal responsibility to see that all requirements are satisfied.

The M.S. CE program at PSH is structured to take full advantage of the specialty areas of expertise of the CE Graduate Faculty. The program requires 31 credits at the 400, 500, 600, or 800 level, including 24 course credits with at least 12 credits at the 500 level, one colloquium credit (CE 590), and six thesis credits (CE 600 or 610). M.S. CE students are required to take an advanced math or statistics course (EMCH 524A or STAT 500). Then students will take 12 credits of civil engineering courses, selected from offerings in structural, transportation, and water resources, with nine (9) credit hours required at the 500-level. Students will take nine (9) additional elective credits at either the 400- or 500-level. These electives may be taken from civil engineering courses or courses offered by other departments that meet the objective of the M.S. CE degree. Students can work with their adviser to select courses that either focus on a specific area of civil engineering or that provide a robust in-depth background of multiple areas of civil engineering. A maximum of four 400-level courses (12 credits) may be taken for the M.S. CE degree.

Original research, usually requiring at least two semesters of work (up to 6 credits), is expected for a thesis. The work should be an in-depth investigation intended to extend the state of knowledge in a specialty area. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense. A maximum of three credits of independent study (CE 596) may be applied towards the M.S. CE degree program, but the undergraduate individual study course (CE 496) will not count towards program credit requirements.

During the first year of enrollment, graduate students will be required to complete an online Responsible Conduct of Research (RCR) training program. This is part of the SARI (Scholarship and Research Integrity) program at Penn State which is designed to offer graduate students comprehensive, multilevel training in the responsible conduct of research. The Office for Research Protections (ORP) will provide the conduit to this training via the SARI Resource Portal on the ORP website (www.research.psu.edu/orp/sari/).

Graduate students will also be required to engage in an additional 5 hours of discussion-based RCR education prior to degree completion. This may be set up as an integral part of the graduate
colloquium.

All students are expected to complete one credit of colloquium (CE 590) during the first two semesters of study. Degree requirements must be completed during a six-year period.

Penn State Harrisburg's M.S. CE program is distinct and independent of the M.S. CE program offered at the University Park campus.

**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.

### E. ADMISSION REQUIREMENTS

Admission into the Master of Science in Civil Engineering program will be based on prior academic records, general GRE scores (verbal, quantitative, and analytical writing), letters of reference, and a personal statement of technical interests, goals, and experience.

Applicants to the M.S. CE program should have an undergraduate degree in civil engineering or other related field. Students who do not have an applicable undergraduate degree may be required to take undergraduate prerequisite courses that will not count toward the master’s degree. An applicant must hold either (1) a bachelor's degree from a U.S. regionally accredited institution, or (2) a postsecondary degree that is equivalent to a U.S. baccalaureate degree earned from an officially recognized degree-granting international institution. In addition to all requirements set by Penn State Graduate School, applicants must have an undergraduate cumulative grade point average of 3.0 or better on a scale of 4.0. Students demonstrating high potential, but failing to meet the minimum GRE score requirements, may be considered on the basis of professional accomplishments and other criteria that may predict success in the program.

**English Proficiency**-- The language of instruction at Penn State is English. 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, 213 for the computer-based test, or a total score of 80 with a 19 on the speaking section for the
internet based test. Applicants with iBT speaking scores between 15 and 18 may be considered for provisional admission, which requires an institutional test of English proficiency upon first enrollment and, if necessary, remedial course work. The minimum composite score for the IELTS is 6.5. Specific graduate programs may have more stringent requirements.

International applicants are exempt from the TOEFL/IELTS requirement who have received a baccalaureate or a master's 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.

Specific graduate programs may require all international applicants to submit a TOEFL or IELTS score, regardless of their academic background and country of origin.

Applicants seeking graduate assistantship support for the M.S. CE program should signify that in a letter enclosed with the other application materials to the Enrollment Services Office at Penn State Harrisburg, Capital College.

**F. Justification for the Degree Title**

The M.S. CE degree will be research-oriented and geared toward students who may eventually seek a Ph.D. as well as those seeking it as a terminal degree. It is expected that the new program will enable the Graduate Faculty to attract research funds to support students and the college, increase the College research revenue, as well as enhance the reputation and competitiveness of the SSET graduate programs. The required master’s thesis warrants the M.S. title.

**G. Accreditation**

Currently, there are no plans to seek accreditation for the M.S. CE degree.

**H. Impact on Other Programs**

The proposed M.S. CE program will have no impact on other existing graduate programs at PSH, nor on the M.S. CE program at UP. As is customary with Penn State degrees offered at multiple locations, this degree would be separate and distinct. Penn State Harrisburg-Capital College will award the M.S. CE degree.
I. CONSULTATION

The following entities have been consulted: The College of Engineering - UP Department of Civil and Environmental Engineering, The Graduate School, and related programs at other Penn State campuses (Great Valley and Behrend).

<table>
<thead>
<tr>
<th>Date</th>
<th>Consultation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several as shown in emails</td>
<td>Dr. Patrick Fox, Head Department of Civil and Environmental Engineering College of Engineering-UP</td>
<td>NOTE: One concern was raised and addressed (non-thesis option was removed). Please see communications below. A copy of the Prospectus was shared with Dr. Fox in October 2016. He expressed support for the program.</td>
</tr>
</tbody>
</table>

From: R. BACHNAK <rab65@psu.edu>
Sent: Friday, April 29, 2016 10:10 AM
To: PATRICK FOX
Subject: MS CE proposal

Dear Pat,

It was nice talking to you earlier this week. Attached is a draft of our proposal for a MS CE program at PSH. Although our committee is in favor of having our own degree (due to the thesis non-thesis options and the flexibility to respond to local industry needs), we are happy to extend your program if you and your faculty prefer that route.

We look forward to hearing from you. All the best,

Ray

Rafic A. Bachnak, Ph.D., P.E.
Director, School of Science, Engineering, and Technology
Penn State Harrisburg
777 West Harrisburg Pike
Middletown, PA 17057-4898
Voice: 717-948-6541, Email: rab65@psu.edu

From: "pjfox" <pjfox@engr.psu.edu>
To: "R. BACHNAK" <rab65@psu.edu>
Cc: "William D. Burgos" <WDB3@engr.psu.edu>, "pjfox" <pjfox@engr.psu.edu>
Sent: Monday, May 9, 2016 5:43:03 PM
Subject: Re: MS CE proposal

Hi Ray -

We ran your proposal through the CEE grad committee and we are supportive with one caveat.
A concern was raised regarding the Option 2 - these are the words of the committee:

As for PSU Hbg’s MS CE proposal, my concern (shared by the EnvE group and members of the Grad Comm) is the so-called ‘Option 2’ where a student complete 3 credits of CE 594 to complete their thesis more as a research paper. ‘Option 1’ is the conventional 6 credits of CE 600 to complete a research-based thesis. ‘Option 2’ is quite similar to degree requirements for the MEng degree we offered in the past (not the new 12-month, coursework-only, professional MEng that we now offer). With an emphasis on a clear distinction between MS and MEng degrees, I think this Option 2 is muddled and may not be approved through the various Grad Curricula committees. I would recommend that they abandon Option 2 and direct student to the MEng degree.

Would it be possible to direct your Option 2 students to the MEng degree only (and not the MS)?
If so, then please consider us to be in 100% support of the proposal.
Please call if you wish to talk directly.
Kind regards,
Pat

-----
Patrick J. Fox, Ph.D., P.E., D.GE, F.ASCE
Department Head
John A. and Harriette K. Shaw Professor
Department of Civil and Environmental Engineering
212 Sackett
Pennsylvania State University
University Park, PA  16802
Tel: (814) 863-3084
pjfox@engr.psu.edu
Board of Governors, ASCE Geo-Institute

From: R. BACHNAK <rab65@psu.edu>
Sent: Tuesday, October 11, 2016 9:14 AM
To: PATRICK FOX
Subject: MS CE Prospectus

Dear Pat,

I am attaching the Prospectus for the proposed MS CE program that we previously discussed. We expect this to be discussed at the next ACGE meeting. If you have any comments or suggestions, please let me know. We appreciate your support as we continue working on this project. Regards,

Ray

From: "pjfox" <pjfox@engr.psu.edu>
To: "R. BACHNAK" <rab65@psu.edu>
<table>
<thead>
<tr>
<th>Date</th>
<th>From</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/2016</td>
<td>Graduate School ACGE</td>
<td>Prospectus submitted for the October 25, 2016 ACGE meeting. No feedback or comments received from ACGE members by December 12, 2016.</td>
</tr>
<tr>
<td>12/2016</td>
<td>Dr. James Nemes, Chancellor and Chief Academic Officer Great Valley</td>
<td>NOTE: A course rollout schedule was suggested. As a result, a three-year course schedule was developed and added to the proposal.</td>
</tr>
</tbody>
</table>
The proposal lists a large number of both 400 and 500 level courses, covering a wide range of disciplines within civil engineering. Presumably these courses have not been offered on a regular basis at Harrisburg, but exist within the catalog. Given the relatively small number of students that the program would have starting out, what would the expected curriculum look like for these students, especially given the requirement that 15 credits must be at the 500 level? The proposal mentions a focus on 3 areas of CE – structures, transportation, and water resources. Including a proposed course rollout schedule for each of these concentrations would be very helpful as I think it would be difficult to include three areas at the outset.

Jim

James A. Nemes, D.Sc.
Chancellor and Chief Academic Officer
Professor of Mechanical Engineering
School of Graduate Professional Studies
Penn State Great Valley
30 East Swedesford Road
Malvern, PA 19355-1443
Phone: 610-648-3335
Fax: 610-648-3377
jan16@psu.edu

From: "R. BACHNAK" <rab65@psu.edu>
To: "JAMES A NEMES" <jan16@psu.edu>
Sent: Monday, December 19, 2016 3:19:47 PM
Subject: Re: consultation -- MS CE proposal

Dear James,

Thank you for getting back to us so quickly. While we have strengths (faculty expertise) in the three focus areas you mention below, we decided not to have three distinct tracks (focus areas) at this time. We plan to expand our course offerings (based on Table 1) as enrollment in the program grows. It seems that the statements regarding focus areas on page 5 are misleading, so we will rewrite to avoid any confusion.

Thanks for suggesting a course rollout schedule. We will create one (possibly for the first 3 to 4 years) and update our proposal. I will share with you the revised proposal once it is ready. Regards,

R. Bachnak

From: "R. BACHNAK" <rab65@psu.edu>
To: "JAMES A NEMES" <jan16@psu.edu>
Sent: Tuesday, January 17, 2017 10:01:39 AM
Subject: Re: consultation -- MS CE proposal

Dear James,
<table>
<thead>
<tr>
<th>12/2016</th>
<th>Dr. Russ Warley, Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Engineering</td>
<td></td>
</tr>
<tr>
<td>Behrend College</td>
<td>We have updated the proposal and added a 3-year course offering schedule (as stated below). Please see the attached file and let me know if you have any additional suggestions. We plan to submit the proposal soon. regards,</td>
</tr>
<tr>
<td>R. Bachnak</td>
<td>On Apr 25, 2017, at 9:46 AM, R. BACHNAK <a href="mailto:rab65@psu.edu">rab65@psu.edu</a> wrote:</td>
</tr>
<tr>
<td>Dear Jim,</td>
<td>Hope everything is going well for you!</td>
</tr>
<tr>
<td>I have no records that show you responded to my message below. The Graduate Council Joint Curricular Committee has reviewed our proposal and raised the following question:</td>
<td>&quot;* It was not clear from the Consultation provided if the changes made to the proposal addressed Jim Nemes’s concerns. Include a response from him indicating whether he concurs with the current version of the proposal.&quot;</td>
</tr>
<tr>
<td>Would you please let me know if the changes we made were satisfactory to you. If not, please let me know what you recommend. Regards,</td>
<td>R. Bachnak</td>
</tr>
<tr>
<td>From: &quot;JAMES A NEMES&quot; <a href="mailto:jan16@psu.edu">jan16@psu.edu</a></td>
<td>To: &quot;R. BACHNAK&quot; <a href="mailto:rab65@psu.edu">rab65@psu.edu</a></td>
</tr>
<tr>
<td>Sent: Tuesday, April 25, 2017 11:46:29 AM</td>
<td>Subject: Re: consultation -- MS CE proposal</td>
</tr>
<tr>
<td>Sorry Ray. Yes that offering schedule was what I was hoping to see Regards Jim Sent from my iPhone</td>
<td></td>
</tr>
<tr>
<td>From: R. BACHNAK [<a href="mailto:rab65@psu.edu">mailto:rab65@psu.edu</a>]</td>
<td>Sent: Wednesday, December 14, 2016 11:38 AM</td>
</tr>
<tr>
<td>To: RUSSELL LEE WARLEY <a href="mailto:rlw27@psu.edu">rlw27@psu.edu</a></td>
<td>Subject: consultation -- MS CE proposal</td>
</tr>
<tr>
<td>RE: Proposal for MS degree in Civil Engineering</td>
<td>Dear Russ,</td>
</tr>
<tr>
<td>We seek your input on another MS proposal (this is the last one). We are proposing a MS in Civil Engineering as described in the attached file. Any feedback that you may be able to provide is very much appreciated. We would appreciate hearing from you by January 14,</td>
<td></td>
</tr>
</tbody>
</table>
2017, if possible. All the best,

Happy Holidays!

Ray

Rafic A. Bachnak, Ph.D., P.E.
Director, School of Science, Engineering, and Technology
Penn State Harrisburg
777 West Harrisburg Pike
Middletown, PA 17057-4898
Voice: 717-948-6541, Email: rab65@psu.edu

From: "RUSSELL LEE WARLEY" <rlw27@psu.edu>
To: "R. BACHNAK" <rab65@psu.edu>
Subject: RE: consultation -- MS CE proposal

Hello Ray,

Dipo Onipede and I took a look at this proposal and we support it.

Best Regards,

Russ

Russell Warley, Ph.D.
Director, School of Engineering
Chair of Industrial Engineering
Assoc. Prof. of Mechanical Engineering
Penn State Behrend
Burke 242
814-898-6389
Appendix A. Market Study

The Market Study was completed by the Office of Marketing Research and Communications at Penn State Harrisburg. Survey results follow.

Civil Engineering Market Study: Degrees Conferred and Employment Projections

**Degrees conferred**

- The number of baccalaureate degrees conferred decreased by nearly 20% from 2011-2012, while the number of graduate degrees conferred increased.

- The percentage of graduate degrees conferred by private institutions has increased at a more rapid pace than public institutions in the past five years. In 2012, over two-thirds of graduate degrees conferred were from private institutions.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Bachelor's degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public graduates</td>
<td>313</td>
<td>377</td>
<td>334</td>
<td>340</td>
<td>343</td>
</tr>
<tr>
<td>Private graduates</td>
<td>322</td>
<td>314</td>
<td>329</td>
<td>304</td>
<td>292</td>
</tr>
<tr>
<td>Total</td>
<td>635</td>
<td>691</td>
<td>663</td>
<td>644</td>
<td>635</td>
</tr>
<tr>
<td>Graduate degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public graduates</td>
<td>70</td>
<td>83</td>
<td>63</td>
<td>59</td>
<td>61</td>
</tr>
<tr>
<td>Private graduates</td>
<td>163</td>
<td>130</td>
<td>67</td>
<td>77</td>
<td>91</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>213</td>
<td>130</td>
<td>136</td>
<td>152</td>
</tr>
<tr>
<td>Total degrees conferred</td>
<td>868</td>
<td>904</td>
<td>793</td>
<td>780</td>
<td>787</td>
</tr>
</tbody>
</table>

**Graduate degrees conferred by region**

- Currently, there are no institutions in our region (Southcentral) conferring graduate degrees in Civil Engineering.

- A majority of degrees conferred are from institutions in the southeastern (Philadelphia), southwestern (Pittsburgh) and State College regions of the state.
Graduate degrees conferred by region

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Southeastern</td>
<td>73</td>
<td>59</td>
<td>68</td>
<td>45</td>
<td>53</td>
</tr>
<tr>
<td>Southcentral</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Southwestern</td>
<td>131</td>
<td>127</td>
<td>62</td>
<td>60</td>
<td>64</td>
</tr>
<tr>
<td>Northeastern</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Northcentral</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Northwestern</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>State College</td>
<td>22</td>
<td>21</td>
<td>37</td>
<td>27</td>
<td>26</td>
</tr>
</tbody>
</table>

Employment data

- Among currently employed civil engineers, 43% hold a bachelor’s degree and 26% hold a master’s degree.
- Labor projections indicate continued growth for civil engineers in our region and across the state.

<table>
<thead>
<tr>
<th>Southcentral region</th>
<th>2010 Employment</th>
<th>2020 Projections</th>
<th>Amount of Change</th>
<th>Annual Growth Openings</th>
<th>Annual Replacement Openings</th>
<th>Annual Total Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>12,830</td>
<td>14,450</td>
<td>1,620</td>
<td>163</td>
<td>260</td>
<td>423</td>
</tr>
<tr>
<td>Southcentral region</td>
<td>2,430</td>
<td>2,690</td>
<td>260</td>
<td>25</td>
<td>49</td>
<td>74</td>
</tr>
</tbody>
</table>
Appendix B. Letters of Support

1. Robert Bylone, Chair, Graduate Technical Advisory Committee
2. Dan Fichtner, Executive Vice President, Providence Engineering
3. David Durst, Structural Engineer, Durst & Taylor Structural Engineering
Appendix C. Faculty Resources

Penn State Harrisburg’s SSET will be fully responsible for staffing courses with qualified faculty, ensuring academic quality, providing academic advising, and other academic responsibilities required for the success of the proposed MS CE program. SSET has been delivering graduate programs since the late 1960s, and currently offers six masters programs (thesis and non-thesis). The size of the CE Graduate Faculty has been enlarged to cover key interests represented in area industries that we partner with in research, development, and service activities. There are a total of ten graduate faculty members with specialties in steel and concrete design, soil mechanics and foundation, storm water runoff treatments, water quality and analysis, construction and transportation, highway and bridge design, solid mechanics and structural analysis. The faculty members are:

Joseph J. Cecere, Ph.D. (North Texas State) Associate Professor of Engineering
Y. Frank Chen, Ph.D. (Minnesota) Professor of Civil Engineering
Yen-Chih (David) Chen, Ph.D. (Purdue) Associate Professor of Environmental Engineering
Shirley Clark, Ph.D. (Alabama-Birmingham) Associate Professor of Environmental Engineering
Sai P. Kakuturu, Ph.D. (Kansas State) Associate Professor of Civil Engineering
Seroj Mackertich, Ph.D. (Penn State) Associate Professor of Engineering
Shashi Marikunte, Ph.D. (Michigan State) Senior Lecturer in Civil Engineering
Grady F. Mathews IV, Ph.D. (South Carolina) Assistant Professor of Civil Engineering
Sofia M. Vidalis, Ph.D. (Florida) Associate Professor of Civil Engineering
Yuefeng Xie, Ph.D. (Tsinghua) Professor of Environmental Engineering
Appendix D. Laboratory Facilities

There are currently four laboratory areas, which are the responsibility of the CE/SDCET faculty and staff. These are:

- Science and Technology Building
- Engineering Lab Building
- CAD Laboratory in the Olmsted Building, Room 208W
- Educational Activities Building, Rooms 111 – 113 and Rooms 116 – 119.

Science and Technology Building: The Science and Technology building houses all of the environmental engineering laboratory facilities. The laboratory facilities include the following.

Room TL-101 – Environmental Microbiology
Room TL 101/115 – Chemistry
Room TL-102 – Environmental Inorganic Chemistry
Room TL-110 – Biological Treatment and Wastewater Microbiology
Room TL-154 – Emerging Organic Containment Control and Analysis
Room TL-164 – Wastewater/Stormwater Pilot Lab
Room TL-165 – Drinking Water Pilot Lab

Chemistry Lab, Science and Technology Building (Room #115): Chemistry laboratory courses are conducted in a single 40’x30’ laboratory with stations for 24 students. Attached to the lab is a 25’ x 32’ stockroom/prep room. The lab benches are equipped with 8 computer stations for running Vernier software and hardware. The Vernier system is designed for real-time data acquisition and work-up, and has greatly enhanced the quality of lab instruction in general chemistry during the past five years. The lab includes a state-of-the-art FTIR which receives heavy use in the organic lab course. The chemistry lab facilities are adequate. Computer facilities to support laboratory work are excellent and have been updated continually, especially over the last five years. Instrumentation, balances, and computing equipment are all up to date and need no immediate upgrades.

Physics lab, Science and Technology Building (Room #127): Until the summer of 2014, all physics lab experiments were conducted in TL 127, located in the Science and Technology Building, occupying 1500 square feet with an adjacent storeroom of 300 square feet. This room has a networked laser printer, 30 desks, and 10 lab workstations, each fitted with a desktop computer interfaced to data acquisition hardware that students use for physics experiments. After the completion of the new EAB, TL 127 has been used primarily for Mechanics Physics courses, while Electromagnetics, Fluid Dynamics, Thermodynamics, Optics, and Modern Physics lab experiments are now conducted in EAB 214.

Engineering Lab Building: The Engineering Lab Building has approximately 6000 ft² for mechanical testing, metallurgy, welding and heat treatment, thermodynamics, heat transfer, fluid mechanics, internal combustion engines, computer numerical control, and a machine shop. Another 3000 ft² contains two classrooms, a garage, and a tool room.

All sections of EDSGN 100S, Introduction to Engineering Design, are held in the Lab Building, so
almost all engineering and engineering technology students from all disciplines come to the building for at least one semester.

**CAD Lab, Engineering Lab Building (Room #109):** This laboratory with 30 student stations is primarily used for all sections of EDSGN 100S. **Microsoft Office, SolidWorks, AutoCAD, Creo, Mathematica, MATLAB, COMSOL, ANSYS,** and **CES** are available for the students. The room is equipped with white boards and an instructor computer station, so it also serves as a lecture room for some Engineering courses, which require computer access for students. When classes are not meeting, students can use the room as an open lab for other course work.

**Whitaker CAD Laboratory, Olmsted Building (Room #208W):** This laboratory with 32 stations is for the exclusive use of the mechanical engineering, mechanical engineering technology, civil engineering, and structural design and construction engineering technology students. **Microsoft Office, SolidWorks, AutoCAD, Creo,** and **Mathematica** are available for the students.

**Surveying Laboratory, Educational Activities Building (Room #111):** This laboratory has 800 ft² floor space and is located in the new wing of the Educational Activities Building. It serves as teaching area as well as storage facility for the equipment. The Surveying Laboratory has six new State-of-the-Art total stations with on-board mapping software. This will complement other existing equipment in the surveying laboratory. The total cost of this new equipment was $47,750. For a list of all the major equipment, please see Appendix A.

**Geotechnical Laboratory, Educational Activities Building (Room #112):** This lab of 1,000 ft² floor space is located in the new wing of the Educational Activities Building. The Geotechnical laboratory has State-of-the-Art equipment for teaching as well as research. Some major equipment includes: Hydraulic conductivity equipment; Soil chemistry equipment and peripherals; and Automatic and manual consolidation equipment. For a list of all the major equipment, please see Appendix A.

**Student Project Room, Educational Activities Building (Room #113):** This lab of 600 ft² floor space is located in the new wing of the Educational Activities Building. It serves the needs of student organizations to participate in regional/national competitions. The student chapter of The American Society of Civil Engineers (ASCE) regularly participates in steel bridge and concrete canoe competition organized by ASCE. The equipment in this room also supports the preparation of samples to be tested in Concrete/Asphalt Laboratory and Structures Laboratory. For a list of all the major equipment, please see Appendix A.

**Sample Preparation and Curing Room, Educational Activities Building (Room #116):** This lab of 950 ft² floor space is located in the new wing of the Educational Activities Building. The equipment in this room supports preparation and curing of samples to be tested in Concrete/Asphalt Laboratory and Structures Laboratory.

**Concrete/Asphalt Laboratory (Room #117):** This lab of 1,260 ft² floor space is located in the new wing of the Educational Activities Building. The Concrete/Asphalt laboratory has State-of-the-Art equipment for teaching as well as research. Some of the major equipment includes: 500 kip compression testing system with digital display used for testing of concrete in compression and bending; Laboratory mixer (20 Quart); High-performance ovens; Vicat testing apparatus; Water baths; Vibrating table; Concrete mixer; Gyratory compactor; High-speed shear mixer; Sieve Shaker; and Sieves. For a list of all the major equipment, please see Appendix A.
Structures Laboratory, Educational Activities Building (Room #118): This lab of 1,400 ft² floor space is located in the new wing of the Educational Activities Building. The Structures Laboratory has a sophisticated servo-hydraulic testing system (MTS Model 311.31 Load Frame) for testing large specimens of concrete and steel. The system, which has a capacity of 220 kips is capable of testing large specimens of concrete, steel, and other metals in compression, tension, and bending. The test frame has a custom T-slot which facilitates the testing of large span beams. The cost of this custom load frame was $269,740. A dedicated 10-ton capacity crane complements in handling large samples. Other major equipment that will supplement the structures lab include: Non-destructive testing system; Rapid chloride permeability system; Rapid freeze-thaw setup; E-meter for flexural resonance testing; and Servo-electric MTS Insight testing system for tension and bending of small samples. For a list of all the major equipment, please see Appendix A.

Materials Testing Laboratory, Educational Activities Building (Room #119): This lab of 1500 ft² is located in the new wing of the Educational Activities Building and is shared with the Mechanical Engineering program. The shared lab is for materials testing with some equipment, such as the hardness testers relocated from the Engineering Lab Building. The Strength of Materials Laboratory has a sophisticated servo-hydraulic testing system (MTS Model 370.50 Load Frame) for testing small specimens of steel, wood, composite, and concrete. The system, which has a capacity of 110 kips has a hydraulic grip for tensile testing. It also has fixtures for testing samples in compression and bending. The cost of this load frame along with the fixtures was $226,460. For a list of all the major equipment, please see the Table below.

The facilities and equipment goal of the Penn State Harrisburg Capital College School of Science, Engineering, and Technology (SSET) is to maintain fully functional laboratories and equipment in a safe environment for students and faculty. Laboratories are maintained with the help of a full-time Research Technologist who serves as laboratory supervisor. Equipment is calibrated depending on its nature. Test equipment calibration follows a schedule with procedures provided by the manufacturers. Hand tools are calibrated on an as-needed basis by the staff, faculty, and students. Hydraulic Testing Equipment (MTS) requires regular service from factory trained technicians to maintain the warranty. At this time, the equipment is under service contract under purchase agreement. Once the service contract expires, the department anticipates extending the contract for service.
Major Equipment - CE/SDCET, Penn State Harrisburg

### Surveying Laboratory (EAB 111)

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<thead>
<tr>
<th>Item</th>
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<th>Quantity</th>
<th>Academic Year</th>
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<td>Crain</td>
<td>4</td>
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<tr>
<td>Leveling Rod</td>
<td>Crain</td>
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### Civil Engineering Materials/Structures Laboratory (EAB 116/117/118)

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<th>Academic Year</th>
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<tr>
<td>3-D Printer</td>
<td>Makerbot Mini</td>
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<tr>
<td>Plastic Extruder</td>
<td>Extruderbot</td>
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<td>2014/15</td>
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<tr>
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<td>MTS 311.31</td>
<td>1 SET with Accessories</td>
<td>2013/14</td>
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<tr>
<td>Overhead Crane, 10 Ton</td>
<td>CRAINTEC</td>
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<td>Sieve Shakers – 8 inch</td>
<td>Dura Tap – Humboldt Mfg.</td>
<td>3</td>
<td>2013/14</td>
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<td>Sieves – 8 inch</td>
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<td>Item</td>
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<td>Quantity</td>
<td>Year</td>
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<td>J-Ring Apparatus, Rebar Rods</td>
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<td>Mixer, 5 Quart + Additional Bowls</td>
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<td>Portable Concrete Mixer, 10 Gallon</td>
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<tr>
<td>Digital Cement Calorimeter</td>
<td>Humboldt Manufacturing</td>
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<td>High Speed Shear Mixer</td>
<td>Gulfstream Manufacturing</td>
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<td>Specific Gravity – Rice Test</td>
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<td>Viscometer</td>
<td>Brookfield Engineering</td>
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<td>Cylinder Splitter</td>
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<td>Vacuum Pycnometer</td>
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<td>Vacuum Pump with Gauge</td>
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<td>Applied Test Systems</td>
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<td>Lapidary Saw</td>
<td>Lortone</td>
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<td>Rapid Chloride Permeability Testing with 4 Cells</td>
<td>GERMANN Instruments</td>
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<td>2011/12</td>
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<td>Rapid Freeze-thaw Cabinet</td>
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<td>E-Meter for Flexural Resonance of Concrete</td>
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<td>Portable Mixer, 5 Gallons</td>
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<td>2011/12</td>
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<td>2011/12</td>
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<td>Metric Scale (Precisions Standard)</td>
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<td>SI/English Electronic Solution Balance</td>
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<td>Concrete Mixer (Yellow)</td>
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**Geotechnical Laboratory (EAB 112)**

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<td>Hydrometer Bath</td>
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<td>Manual Consolidation Frame</td>
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<td>Computer-controlled Automatic Consolidation Equipment</td>
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<td>Standard Proctor Compaction Testing Equipment</td>
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<td>Falling Head Permeability Setup</td>
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<td>Gilson</td>
<td>SET</td>
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### Materials Laboratory (EAB 119)

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<td>Heat Treatment Furnace</td>
<td>Paragon</td>
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<td>Fatigue Dynamics</td>
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<tr>
<td>Tube Furnace with Vacuum Pump</td>
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<td>Tinius Olsen</td>
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<td>Phase II+ Analog Testers</td>
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<td>Hand-held Thermocouple Readers</td>
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<tr>
<td>Drill Press</td>
<td>Powermatic</td>
<td>1</td>
<td>2013/14</td>
</tr>
<tr>
<td>Band Saw</td>
<td>Powermatic</td>
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<tr>
<td>Table Saw</td>
<td>Craftsman</td>
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<td>2013/14</td>
</tr>
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<td>Grainger</td>
<td>1</td>
<td>2013/14</td>
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<tr>
<td>Generator</td>
<td>Honda</td>
<td>1</td>
<td>2013/14</td>
</tr>
<tr>
<td>Mechanics Tool Set</td>
<td>Craftsman</td>
<td>SET</td>
<td>2013/14</td>
</tr>
</tbody>
</table>
Appendix E. Computing Resources

Information Technology Services (ITS) provides leadership and support for all classroom, laboratory, collaborative learning spaces and office computers, peripherals, and networks. All campus computers are loaded with technical and professional software that support the engineering programs. The University maintains many site licenses for popular packages that are made available to students, faculty, and staff in all labs and in offices by request. Microsoft Office is available on all campus computers. Software updates are centrally maintained and are automatically pushed out to the devices when new versions are available or a vulnerability needs to be addressed. Hardware updates are nominally three years for a laptop and four for a desktop. ITS also maintains a wireless network on campus for laptop users and those with BYOD devices. Students are able to access the network from all buildings on campus, independent of the platform they choose to use.

Up-to-date equipment, computers, and programs available to mechanical engineering students enable the program faculty to assist students in preparing to work in the mechanical field in industry and government. Program Objectives include potential work sites and type of work that CE CA graduates should be qualified to do. In part because of the equipment and facilities, the faculty is able to deliver courses that challenge students to solve mechanical problems in a work-related environment. Showing students how to deal with the mechanical world beyond textbooks is a proactive approach to having them commit to lifelong learning.

**General computer support**: Engineering students have access to a variety of computer labs across campus. The Olmsted Building and the Library have teaching labs that are open to all students when classes are not meeting. Olmsted has a suite of four labs in the basement plus four other labs spaces while the Library has three large labs. Numerous other small labs and collaboration spaces can be found around campus. (see the end of this document for a full listing of collaborative learning spaces)

ITS @ PSH provides a wide range of computing resources and services to students at the Penn State Harrisburg campus, with additional resources and services provided through the ITS group at the University Park campus.

**Computer Labs**: ITS provides and/or supports 20 Computer Labs with a total of more than 950 computers (approximately 850 PCs, 70 Macs, and 30 Linux). All Computer Labs include an instructor station with a projector. Users in these rooms have access to all the software resources of the University and the Internet. The majority of the Computer Labs are for public use by any faculty member, staff member, or student. A handful of specialized labs restrict access to subsets of students, e.g., EET students, Chemistry students, CAD students, or others. Lab hours vary depending on the lab and depending on access restrictions. Restricted-access labs generally have a physical access control system allowing access to authorized students at any time the building is open. The Labs may be scheduled for classes as available.

**Technology Enhanced Classrooms**: ITS provides and/or supports more than 75 computer-fronted classrooms. Each classroom includes an instructor machine, projector, DVD, and podium. Using these rooms, instructors have access to all the resources of the University and the Internet and can project their computer display to the entire class. The rooms may be scheduled for classes as available.
Computer Software: Computer users at PSH have access to a full range of general software such as the Microsoft Office Suite (Word, Excel, PowerPoint), email, web browsers, Adobe Reader, media players, Doceri, and much more. ITS @ UP provides blogging, web-hosting, podcasting, and other advanced services. Specialty labs include curriculum-specific software installed at the request of the faculty. Students at PSH also have access to high-end graphics workstations for digital photography and digital video through the resources of the Media Commons.

Desktop Computing: Essentially all faculty and staff members at PSH have a desktop computer. Many faculty and some staff members also have laptop computers. All machines have access to the full range of software discussed above.

Computer Security: All machines on the PSH campus which conform to ITS guidelines receive regular Windows security updates and are configured with Symantec Antivirus and regularly updated. Individual PCs are backed up regularly and offsite backups are created nightly using University Park facilities. Spam filtering is provided as a central service of ITS @ UP. The University is protected from external networks by a high-end firewall system, and within the University, administrative (faculty and staff) machines are protected from academic (public and student-oriented) machines by an internal firewall.

ITS @ Harrisburg/John D. Hoh/Campus Technology Officer

Collaborative/Active Learning Spaces – **bold is a new space**
November, 2016

Library 203 (32 seats) – Multiple projection screens, Ultra-light portable marker boards, four tables with a Media Scape and a laptop.

Library 305 (20 seats) - Flexible seating (node chairs), Ultra-light portable marker boards

**Library 202e and 202d** – Flexible seating for 50

Library 201C - One Button Studio Room. 1 PC, Camera to record actions

Library first floor – many collaborative study rooms/spaces for group work

Olmsted E252 (24 seats) – Dual Flat Screens, Flexible Seating, Ultra-light portable marker boards

Olmsted E253 (40 seats) – Dual Projectors, Flexible Seating, Ultra-light portable marker boards

**Olmsted E264 (36 seats)** - Dual Flat Screens, Flexible Seating, Ultra-light portable marker boards

Olmsted E334 (25 seats) - Dual Flat Screens, Computers at each seat, collaborative group seating

**Olmsted E306 (26 seats)** - Dual Flat Screens, Flexible Tables, portable marker boards, Polycom Video Conferencing option.

Olmsted C8 Lounge – 3 All-In-One PCs, scanner, collaboration/group study (media scape) with VGA video/audio connections for up to four devices, another Large LCD with multiple ports, and an apple TV
EDUC ACT 217 Computer Lab - 9 PCs, collaboration seating, white boards and large LCD TV
EDUC ACT Lounge – Computer with Printer, collaborative tables and whiteboard
EAB 2nd floor lounge – collaborative seating with glass whiteboards

Active Learning Spaces in the near future (Summer 2017) will include:

Olmsted E308 (26 seats) - includes Polycom Video Conferencing – clone of E306
Olmsted E265 (36 seats) – similar to E264
Appendix F. Library Resources

The Library is a state-of-the-art facility that opened in January 2000. This 115,000 square-foot building features: seating for 735 users, Internet access (wireless or wired) at 100% of the general purpose seats, technology-enhanced classroom, library instruction lab, two seminar rooms, 14 group study rooms, a Cybercafé, and collection growth capacity for 20 years.

The Harrisburg Campus is home to the second-largest library, in terms of number of materials, among the Penn State University Libraries system. The facility houses a collection of more than 300,000 total volumes and nearly 1,300,000 microforms (microfiche, microfilm, and micro card). It maintains current subscriptions to more than 600 periodical titles. Other materials in the library collection include: videos (DVD), audios (CD-ROM and LP), technical reports, industry standards, theses, and some dissertations.

All employees and students have access, regardless of location, to more than 749 databases, many of which also provide access to the full-text of more than 110,000 cited publications. Students may access the more than 7.2 million books and 444,358 e-books. All electronic resources are licensed and provided by the Penn State University Libraries and Department for Information Technologies. A sampling of the resources available include, but are not limited to: ACM Portal (computer science), American Society for Testing and Materials (standards), ASCE Online Journals (civil engineering), ASME Online Journals (mechanical engineering), CHEMnetBASE (chemical reference works), Compendex (all engineering disciplines), ENGnetBASE (engineering handbooks), Environmental Sciences (environmental engineering), IEEE Xplore (electrical engineering), Knoval (engineering and science reference books), Mechanical Engineering Abstracts (mechanical engineering), INSPEC (computer science and electronics), NTIS (government-sponsored engineering and science reports), Safari (computer manuals), and SciFinder Scholar (chemistry and physics). In addition technical manuals are available in the open stacks or on reserve (print and electronic). Trade magazines are available in the current and bound periodicals areas and electronically, where a University-wide subscription exists. Specifications are available in the open stacks, and electronically where a University-wide subscription exists.

At present, students and employees access computerized databases and information sources from wherever they have access to the Internet, including both within and outside the library. Within the library, students have access to 74 general purpose, 35 classroom, and 39 lab computers. Outside the library, students and employees have access from campus offices, classrooms, laboratories, and residence facilities via the Penn State University-wide area network. Students and employees also have access to all electronic resources from commercial Internet providers, provided they have a valid Penn State Access Account username and password.

The library is open for walk-in use 92 hours per week during the spring and fall terms and 68 hours during the summer session. A cybercafé, located inside the library and equipped with computers, study seating, and vending machines, is open for student use 24 hours a day. The electronic resources and services are accessible 24 hours a day, seven days a week.

A comprehensive array of services is provided. They include: reference assistance, research consultation, course-related instruction, loaner laptops, group study room reservations, electronic reserves, interlibrary loan, electronic resources workshops, faculty purchase recommendations, photocopiers, multimedia equipment, and collection development.
There are six professional librarians, 10 full-time staff, and 6 FTE student assistants. All professional librarians hold a graduate degree from an institution accredited by the American Library Association. One librarian is a Ph.D. candidate and two others possess a second masters.
Graduate Council
Program, Option, or Minor Proposal Form

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

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

College/School: Penn State Harrisburg
Department or Instructional Area: School of Science, Engineering, and Technology

New Graduate Program, Option, or Minor: Add
Designation of new graduate program: Master of Science in Mechanical Engineering
Classification of Instructional Programs (CIP) Code: ____________
Designation of new graduate option:
Designation of new graduate minor:

Indicate effective semester:
X 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
Rafie A. Bachnak, Ph.D., P.E.
Printed name
Signature
Date: 2/16/17

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

Approved by College/School Dean/Chancellor (or Designee):
Peter Idowu
Printed name
Signature
Date: March 3, 2017
Recommended by Chair, Graduate Council Subcommittee on New and Revised Programs and Courses:

On Behalf of John Challis  
Printed name  
Signature  
Date: 6/23/2017

Recommended by Chair, Graduate Council Committee on Programs and Courses:

On Behalf of M. Kathleen Heid  
Printed name  
Signature  
Date: 6/23/2017

Noted by Dean of the Graduate School:

On Behalf of Regina Vasilatos-Younken  
Printed name  
Signature  
Date: 6/23/2017
Proposal for a
Master of Science in Mechanical Engineering
Degree Program

School of Science, Engineering, and Technology
Penn State Harrisburg
Revised June 2, 2017
A. JUSTIFICATION FOR THE PROGRAM

The greater Harrisburg community of south central Pennsylvania is home to technology industries in steel manufacturing, boiler design, process control, and electrical connectors. Penn State Harrisburg’s location in Middletown is within the rim of the “connector valley” which is home to more than 20 companies involved in research and development of connectors for transmitting a variety of electrical/electronic signals. These technology industries have employed many of the School of Science, Engineering, and Technology’s mechanical engineering and mechanical engineering technology graduates. Also, many employees of these industries are enrolled in advanced engineering classes for continuing education opportunities. Penn State Harrisburg’s SSET is the only program within 60 miles of Harrisburg that offers an advanced degree in engineering science to support this essential human resource development need.

The School of Science, Engineering, and Technology has offered a master’s in engineering program (M.Eng.) in Engineering Science (ESC) for many years. The Master of Engineering degree was designed and targeted primarily to meet the needs of full-time career engineers in the south central Pennsylvania region in order to support the crucial need for manpower development in engineering research and product development. The program has been a success and continues to serve the intended purpose. In recent years the Master of Engineering program has attracted a new demographic category of applicants seeking to pursue a master’s degree with a strong research component, full-time or part time. These include applicants from local industries and recent graduates of our ABET- accredited Bachelor of Science in Mechanical Engineering (BS ME) program; most of these applicants reside in the south central PA region.

Full-time enrollment in the M.Eng. ESC Program has been low, but steady. However, the M.Eng. Program does not quite fit the educational goals of many aspiring full-time students because of the modest research expectation of the program. The needs of many industries currently partnering with or seeking opportunities for collaboration with Penn State Harrisburg will be better served through a graduate degree program with a more intense research focus, and with a schedule of course offerings (e.g., evening courses) that would enable students to pursue the degree while remaining employed in the area.

The Master of Science in Mechanical Engineering (M.S. ME) degree with thesis will address the needs of the new pool of applicants, as well as create an environment to better serve the technology, research, and human resource concerns of the mid-state region, which includes Harrisburg, Lancaster, York, and Carlisle. This is consistent with the vision and mission of SSET, and it is the objective and rationale for proposing this M.S. ME degree program.

It is expected that the new program will enable the graduate faculty to attract research funds to support students and increase the College research revenue, as well as enhance the reputation and competitiveness of SSET graduate programs.

The M.Eng. ESC degree will continue to serve the demands of career professionals who prefer updating their knowledge base through advanced coursework and integrating professional
practice through a work-related research paper. The M.S. ME degree will be research-oriented and geared toward students who may eventually seek a Ph.D. as well as those seeking it as a terminal degree. We anticipate enrollment in the M.S. ME program will reach 20 within the first two years.

Penn State Harrisburg currently offers 22 master's degrees and three doctoral programs. The School of Science, Engineering, and Technology offers master's programs in Computer Science (M.S.), Electrical Engineering (M.S. and M.Eng.), Engineering Management (M.P.S.), Engineering Science (M.Eng.), Environmental Engineering (M.Eng.), and Environmental Pollution Control (M.S. E.P.C. and M.E.P.C.)

A market study for the viability of the program is included in Appendix A. Also, letters from industry representatives in Penn State Harrisburg’s service region and employers of our BS ME and BS MET graduates are enclosed in Appendix B.

**B. OBJECTIVES**

The M.S. ME degree program at Penn State Harrisburg will provide students with an educational foundation that prepares them for leadership roles in engineering research and product design/development. Students will receive broad scientific knowledge, and exposure to modern analytical techniques that will enable them to formulate engineering problems and perform analysis and synthesis, which are necessary in the successful practice of mechanical engineering.

Students will learn to read, interpret, and critically assess literature in specialized fields of mechanical engineering, and then conceive, develop, and conduct original research leading to useful applications in materials, manufacturing, thermo-fluids, control systems and design areas. Attainment of these learning objectives will be measured by the successful completion of all degree requirements, including prescribed courses and electives, preparation of a master’s thesis, and final oral defense of the thesis. Additionally, students will be mentored to prepare research proposals and technical reports, present research work in seminars, and publish in peer-reviewed journals.

**C. NEW COURSES**

No new courses will be required for the M.S. ME degree program. The complete set of mechanical engineering graduate courses to support the proposed program is available on the University bulletin list of graduate courses. Several of these courses are regularly offered in the existing Penn State Harrisburg Master of Engineering in Engineering Science program. Elective courses are also available outside of the ME program through the computer science, environmental engineering, and engineering science graduate programs, as well as the biomedical engineering program at Penn State Hershey.
D. PROGRAM STATEMENT

Penn State Harrisburg (PSH) is located within a short commute from York, Lancaster, Carlisle, Reading and Harrisburg industrial centers concentrated on manufacturing, engineering consulting, product design and development. The Master of Science in Mechanical Engineering degree program is designed to provide support for industrial research needs, as well as offer an avenue for Penn State Harrisburg BS ME graduates to continue their education in the south central Pennsylvania region. The program is accessible to engineering professionals who wish to pursue advanced studies without giving up their current employment. The program may be completed on a full-time or part-time basis. Classes are scheduled weekly in three-hour evening sessions, offering a convenient format for career professionals seeking to enroll part time. Whenever possible, the program will take advantage of the specialized equipment and research facilities available in the local industries to enhance the training of M.S. ME students.

1. Degree Requirements

All graduate students in Mechanical Engineering are required to adhere to the requirements of the Graduate School, as found in the Graduate Degree Programs Bulletin. The requirements of the Graduate School, however, are minimum requirements and the policies, procedures, and regulations listed below are additional and more specific for graduate students pursuing the M.S. in Mechanical Engineering degree. Advisers will call pertinent regulations to the attention of their advisees, but it should be understood that it is the student’s personal responsibility to see that all requirements are satisfied.

The ME program has established a six-year time limit for completion of the M.S. degree. Extension beyond six years requires the approval of the ME Graduate Faculty. The student must maintain a minimum grade point average (GPA) of 3.00 or better on a 4.00 scale in 400-, 500-, and 800-level courses listed on her/his Plan of Study.

Penn State Harrisburg’s M.S. ME program is distinct and independent of the M.S. ME program offered at the University Park campus. The M.S. ME program at PSH is structured into three areas of concentration in order to take full advantage of the specialty areas of expertise of the ME Graduate Faculty. The areas are Thermo-Fluids Science, Mechanical Science, and Materials Science. The program requires 31 credits, including 24 course credits with at least 15 credits at the 500 level, one colloquium credit, and six thesis credits. All students are required to take a 500-level mathematics course (EMCH 524A) in addition to courses in one of the three concentration areas. The concentration courses are intended to establish the fundamentals of the technical areas. To incorporate breadth into the program, students are required to take at least one course in a different concentration area. A maximum of three 400-level courses (9 credits) may be taken for the M.S. ME degree.

The M.S. degree program is designed for students to gain advanced knowledge for research, analysis, and design in mechanical engineering. Students must complete 24 course credits and submit a thesis (6 credits) to the Graduate School. The requirements for the M.S. ME degree program are:
A minimum of 31 course credits at the 400, 500, 600, and 800 level, of which 20 course credits must be earned at Penn State. The required course credits must be completed with a grade point average of 3.00 or higher.

At least 18 credits must be earned in 500- and 600-level courses.

The M.S. ME requires three credits of mathematics; EMCH 524A meets the mathematics requirement.

Preparatory course(s) required for teaching assistants (such as ENGR 888), remedial courses, and any courses required in our undergraduate program are not counted toward degree requirements for the M.S. degree.

Table 1 provides an outline of the proposed M.S. ME curriculum and Table 2 shows a list of available courses.

**CULMINATING EXPERIENCE - M.S. THESIS**

A candidate registers for a minimum of six credits of ME 600 or ME 610 and submits a thesis following the procedures specified by the Graduate School.

During the first year of enrollment, graduate students will be required to complete an online Responsible Conduct of Research (RCR) training program. This is part of the SARI (Scholarship and Research Integrity) program at Penn State which is designed to offer graduate students comprehensive, multilevel training in the responsible conduct of research. The Office for Research Protections (ORP) will provide the conduit to this training via the SARI Resource Portal on the ORP website (www.research.psu.edu/orp/sari/). Graduate students will also be required to engage in an additional 5 hours of discussion-based RCR education prior to degree completion. SARI instruction will be included as an integral part of the graduate colloquium.

All students are expected to complete one credit of colloquium (ME 590) during the first two semesters of study. Degree requirements must be completed during a six-year period. Students who have deficiencies in the use of spoken or written English may be required to take speech and writing classes in addition to the specified degree requirements. Credits earned to remediate deficiencies cannot be applied towards requirements for the M.S. degree. The two-year course scheduling plan for the M.S. ME degree program is presented in Table 3.
Table 1: Outline of the Proposed M.S. ME Program

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>EMCH 524A</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Concentration area</td>
<td>Thermo-Fluids Science</td>
<td>Mechanical Science</td>
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<tr>
<td>Electives (including at least one outside concentration area)</td>
<td>ME 590</td>
<td>1</td>
</tr>
<tr>
<td>Colloquium</td>
<td>ME 600</td>
<td>6</td>
</tr>
<tr>
<td>Thesis/scholarly paper research</td>
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</tbody>
</table>

Total credits: 31

Table 2: List of Courses

**General courses**
- EMCH 524A Mathematical Methods in Engineering (3)
- ME 444 Engineering Optimization (3)
- ME 461 Finite Elements in Engineering (3)
- ME 596 Individual Studies (1-9)
- ME 600 Thesis Research (3)

**Thermo-Fluids Science courses**
- ME 401 Refrigeration and Air Conditioning (3)
- ME 408 Energy Systems (3)
- ME 420 Compressible Flow I (3)
- ME 427 Incompressible Aerodynamics (3)
- ME 431 Internal Combustion Engines (3)
- ME 504 Advanced Engineering Thermodynamics (3)
- ME 512 Heat Transfer - Conduction (3)
- ME 521 Foundations of Fluid Mechanics I (3)
- ME 523 Numerical Solutions Applied to Heat Transfer and Fluid Mechanics Problems (3)

**Mechanical Science courses**
- ME 445 Microcomputer Interfacing for Mechanical Engineers (3)
- ME 446 Reliability and Risk Concepts in Design (3)
- ME 469 Metallic Manufacturing Processes (3)
- ME 470 Analysis and Design in Vibration Engineering (3)
- ME 481 Introduction to Computer-Aided Analysis of Machine Dynamics (3)
- ME 545 Mechatronics (3)
- ME 554 Digital Process Control (3)
- ME 560 Solid Mechanics (3)
- ME 577 Stochastic Systems for Science and Engineering (3)

**Materials Science courses**
- MATSE 401 Thermodynamics of Materials (3)
- MATSE 419 Computational Materials Science and Engineering (3)
- MATSE 436 Mechanical Properties of Materials (3)
- MATSE 507 (BIOE 517) Biomaterials Surface Science (3)
- MATSE 510 (CHE 510) Surface Characterization of Materials (3)
- MATSE 564 (EMCH 535) Deformation Mechanisms in Materials (3)
- MATSE 565 Metals in Electronics (3)
- xx xxx - 500 or 800-level courses in ENGINEERING, COMPUTER SCIENCE, or MATHEMATICS (must be preapproved)
Table 3: Tentative Two-year Course Offering Plan

<table>
<thead>
<tr>
<th></th>
<th>Year # 1</th>
<th>Year # 2</th>
</tr>
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<tr>
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<td>Fall</td>
<td>Spring</td>
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<tr>
<td>Thermo-Fluids Science</td>
<td>ME 427</td>
<td>ME 521</td>
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<tr>
<td></td>
<td>ME 504</td>
<td>ME 431</td>
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<td>Mechanical Science</td>
<td>ME 445</td>
<td>ME 560</td>
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<td></td>
<td>ME 545</td>
<td>ME 469</td>
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<td>Materials Science</td>
<td>MATSE 564</td>
<td>MATSE 565</td>
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<td></td>
<td>MATSE 419</td>
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<tr>
<td>All tracks</td>
<td>EMCH 524A</td>
<td>ME 461</td>
</tr>
<tr>
<td></td>
<td>ME 596</td>
<td></td>
</tr>
</tbody>
</table>

2. Supervision and Advising

The M.S. ME Program Coordinator will select an interim academic adviser for the student at the beginning of the first semester. It is the responsibility of the M.S. student to consult with possible research supervisors and to work with the supervisor in developing a plan of study during the first semester of enrollment in the M.S. ME program. The research supervisor may suggest and approve 500-level courses from other departments to be included in the M.S. program. The student and adviser will also identify other faculty members who will serve on the student's committee. By the end of the second semester, the student should complete the committee membership approval form, request the approval of the student's committee and tentatively identify the research topic.

3. Thesis

Original research, requiring at least two semesters of work (at least 6 credits), is expected for a thesis. The work should be an in-depth investigation intended to extend the state of knowledge in some specialty area. Format requirements for the contents of the thesis are available in the Thesis Guide from the web page at http://www.gradsch.psu.edu/current/thesis.html Committee members may request periodic progress reports which may contain materials that will appear in the thesis. When work is satisfactorily completed, the grade of ‘R’ will be assigned for ME 600 credits.

4. Committee Specifications

A student's M.S. committee must have at least three members, two of whom must be Mechanical Engineering program Graduate Faculty. The chair or one of the co-chairs must have a tenured or tenure-track appointment in the Mechanical Engineering program and all persons serving as chair or co-chair of a committee must be members of the Graduate Faculty. The committee may have additional members who are appointed to the Graduate Faculty at large or who have a professorial appointment in the Mechanical Engineering program area or in a department related to the research topic. This committee must be appointed by the end of the second semester.
Two weeks prior to the thesis defense, the completed thesis should be delivered to the committee members and a defense date must be scheduled with the department's graduate program staff assistant, who will provide assistance with the room reservation and publicity for the public presentation. All committee members must attend the defense. After the defense and completion of the thesis all members of the committee and the Program Coordinator will sign the signature page of the approved thesis. These individuals will also sign a thesis completion report to be placed in the student's file. The student will provide copies of the approved thesis to all committee members as requested and to The Graduate School as required.

5. Time Limits

The ME program has established a six-year time limit for completion of the M.S. degree. Any extension beyond six years requires the approval of the ME Graduate Faculty.

6. GPA Requirement

The student must maintain a minimum grade point average (GPA) of 3.00 or better on a 4.00 scale in 500- and 400-level courses listed on her/his Plan of Study.

7. University Bulletin: Graduate Degree Programs Copy

Mechanical Engineering
School of Science, Engineering, and Technology
Penn State Harrisburg – W239 Olmsted Building
777 West Harrisburg Pike, Middletown, PA 17057
(717) 948-6116

Degree Conferred: M.S.

The Mechanical Engineering Graduate Faculty
Ma’moun Abu-Ayyad, Ph.D. (New Brunswick) Associate Professor of Mechanical Engineering
Issam Abu-Mahfouz, Ph.D., P.E. (Case Western Reserve) Associate Professor of Mechanical Engineering, Mechanical Engineering Program Chair
Amit Banerjee, Ph.D. (New Jersey Institute of Technology) Associate Professor of Mechanical Engineering
Richard Ciocci, Ph.D., P.E. (Maryland), Associate Professor of Mechanical Engineering
Ram Goel, Ph.D. (Michigan State) Assistant Professor of Mechanical Engineering
Harris Imadojemu, Ph.D. (North Carolina State) Associate Professor of Mechanical Engineering
Brian Maicke, Ph.D. (Tennessee) Assistant Professor of Mechanical Engineering
AHM Esfakur Rahman, Ph.D. (North Dakota) Lecturer in Mechanical Engineering
Ola Rashwan, Ph.D. (Windsor) Lecturer in Mechanical Engineering
Fariborz Tavangarian Ph.D. (Louisiana State) Assistant Professor of Mechanical Engineering
Rugun Nathan, Ph.D. (Drexel University) Associate Professor of Mechanical Engineering
The Program

Mechanical Engineering

Penn State Harrisburg (PSH) is located within a short commute from York, Lancaster, Carlisle, Reading, and Harrisburg industrial centers concentrated on manufacturing, engineering consulting, product design, and development. The Master of Science in Mechanical Engineering degree program is designed to provide support for industrial research needs, as well as offer an avenue for Penn State Harrisburg B.S. ME graduates to continue their education in the south central Pennsylvania region. The program is accessible to engineering professionals who wish to pursue advanced studies without giving up their current employment. The program may be completed on a full-time or part-time basis. Classes are scheduled weekly in three-hour evening sessions, offering a convenient format for career professionals seeking to enroll part time. Whenever possible, the program will take advantage of the specialized equipment and research facilities available in the local industries to enhance the training of M.S. ME students.

ADMISSION REQUIREMENTS

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.

Admission into the Master of Science (M.S.) Mechanical Engineering program will be granted only to candidates who demonstrate high potential for success in graduate studies. Applicants should have undergraduate degrees in engineering or technology fields from an accredited university and must meet the admission requirements as set by Penn State's Graduate School.

An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale, and scores from the GRE are required for admission. Applicants should submit the following:

- a completed Graduate School online application with the application fee;
- official transcripts from all post-secondary institutions attended;
- three (3) letters of professional recommendations from individuals who can evaluate the applicant’s potential;
- a personal statement of professional interest, goals, and experience;
- test scores from the Graduate Record Examination (GRE);
- statement of interest in graduate assistantship, if desired.

English Proficiency
The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. Consult the English Proficiency
“Degree Requirements
Requirements listed here are in addition to requirements stated in the \textbf{DEGREE REQUIREMENTS} section of the Graduate Bulletin.

A minimum of 31 credits at the 400, 500, 600, or 800 level is required, including 24 course credits with at least 15 credits at the 500 level, 1 credit of ME 590 Colloquium, and 6 credits of thesis research (ME 600 or 610). The 24 course credits consist of:

- EMCH 524A Mathematical Methods in Engineering (3 cr.)
- Concentration Area (9 cr.): Students take 9 credits in one of the following concentrations: Thermo-Fluids Science, Mechanical Science, or Materials Science. A list of courses that will count towards these concentrations is maintained by the program office.
- Electives (12 cr.): Students take 12 credits of electives from a list of approved electives maintained by the program office. To incorporate breadth into the program, students are required to take at least one elective course in a Concentration Area other than the one they complete.
- A maximum of 3 400-level courses (9 credits) can be counted towards the degree requirements for the M.S. A minimum of 12 credits must be earned in 400- and 500-level courses in Mechanical Engineering.

Students who have deficiencies in the use of spoken or written English may be required to take courses in these areas in addition to the specified degree requirements. Credits earned to remediate deficiencies cannot be applied towards requirements for the M.S. degree.

Degree requirements must be completed within six years of admission to degree status.

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

\textbf{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.

\textbf{F. JUSTIFICATION FOR THE DEGREE TITLE}
The M.S. ME degree will be research-oriented and geared toward students who may eventually seek a Ph.D. as well as those seeking it as a terminal degree. It is expected that the new program will enable the Graduate Faculty to attract research funds to support students and the college,
increase the college research revenue, as well as enhance the reputation and competitiveness of the SSET graduate programs. The required master’s thesis warrants the M.S. title.

G. ACCREDITATION

Currently, there are no plans to seek accreditation for the M.S. ME degree.

H. IMPACT ON OTHER PROGRAMS

The proposed M.S. ME program will have no impact on other existing graduate programs at PSH, nor on the M.S. ME program at UP. As is customary with Penn State degrees offered at multiple locations, this degree would be separate and distinct. Penn State Harrisburg-Capital College will award the M.S. ME degree.
I. CONSULTATION

The following entities have been consulted: The College of Engineering - UP Department of Mechanical Engineering, The Graduate School, and related programs at other Penn State campuses (Great Valley, Behrend, and Berks).

<table>
<thead>
<tr>
<th>Date</th>
<th>Consultation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/2016</td>
<td>Dr. Karen Thole, Head Dept. of Mechanical Engineering College of Engineering Penn State University-UP</td>
<td>NOTE: Several questions were raised and addressed as shown below. Additional changes were made due to feedback from other reviewers. A copy of the Prospectus was shared with Dr. Thole in October 2016. She expressed support for the program.</td>
</tr>
</tbody>
</table>

From: "Karen Thole" <kthole@engr.psu.edu>
To: "R. BACHNAK" <rab65@psu.edu>
Cc: "Peter J. Butler" <pjbbio@engr.psu.edu>, "Mary Frecker" <mxf36@engr.psu.edu>, KThole@psu.edu
Sent: Sunday, May 1, 2016 8:23:05 PM
Subject: RE: MS ME proposal

Dear Ray,

We reviewed your proposal and agree that it would be best to keep it distinct from our MSME Program at UP. We, too, are concerned that it will become rather sluggish if we decide to make changes thereby requiring both of our campuses to approve all changes.

A few concerns that I have about the proposal are the following:

1) will additional resources be required for the students to complete their MS research? It seems you are indicating that they will complete their research in the undergraduate laboratories. I know from the high cost of paying start-ups of new faculty who are doing research, that this is an important consideration. I would think that the university administration would need to understand those additional required costs, which are inherent in running research programs.

2) is it the intention that the MS students be supported for doing their research?

3) what are the requirements for the paper option? This is important to maintain quality of the program. We defined a standard for our paper option and you may want to do the same.
Thanks for allowing us to review your proposal.

Karen

From: R. BACHNAK [mailto:rab65@psu.edu]
Sent: Sunday, June 19, 2016 4:31 PM
To: Karen Thole
Cc: Peter J. Butler; Mary Frecker; KThole@psu.edu
Subject: Re: MS ME proposal

Dear Karen,

Hope everything is going well with you and you are enjoying the summer break!

We appreciate your support, and sorry for the delay in getting back to you. It took some time for our faculty committee to meet to discuss your concerns/questions. The following summarizes our response.

Answer to question 1:
The Committee identified the need for four new labs that can support the equipment and software needed for MSME student research. One lab should be a general computer lab while the other three should be controls, fluids, and materials to correspond to the program tracks. More details about the lab requirements will be known as grant proposals are written and funding is secured. The Committee recognizes the challenge in securing necessary lab space and recommends an immediate plan that will lead to a broader approach once additional space becomes available.

(a) There is space in the Educational Activities Building identified for a new graduate computer lab that will be shared with MS Civil Engineering students. Computer and software support will fall into existing program and school budgets. Grants will be used to expand hardware and software capabilities. The existing computer lab in Olmsted (W209) will be also available for use by graduate students.

(b) Currently, the mechanical engineering and engineering technology programs share a materials lab with the civil and structural technology programs in EAB 119. This 1500
ft² lab includes new ovens and Experimental Determination of Mechanical Response of Materials for tensile testing of carbon/jute/glass fiber-polyester composites based on ASTM D638-10. Since 2011, $406,045 worth of equipment has been purchased on behalf of the mechanical programs. Graduate student research can be accommodated in this facility as it is used by undergraduates approximately 10 hours per week for scheduled lab classes and another 10 hours for independent work. The current space will support MSME Materials Track research.

(c) Automation and Controls research can be supported by the sharing of two facilities with the electrical engineering and technology programs. A 1000 ft² lab exists in Educational Activities Building (EAB) room 101 and a comparable sized room on the second floor of EAB (electrical area) is also available. Approximately $80,000 in automation hardware and software and robots has been spent on EAB 101 lab by the ME programs. Similar expenditure has been made by the EE program. The shared labs allows for good support of MSME Design track.

(d) The 1000 ft² Thermal/Fluids Lab in EAB 104 is nearly full with equipment. Graduate research could be accommodated as needed in the remaining space. The ME Faculty has two dedicated research labs on the second floor of EAB - one lab has a wet sink that can support research by MSME Thermal/Fluids track students.

The College administration is committed to providing needed funds to acquire new equipment that compliment faculty grant activities and student research. As the program grows, additional laboratory space will be dedicated to support program activities.

**Answer to question 2:**
Yes, the Committee expects that most MSME students will be funded by grants and other research projects. While Capital College does have some general assistantship funding for current graduate students, the primary funding source will need to be grant supported. Once the Capital MSME degree is approved, faculty members can continue grant writing with full-time, research-oriented graduate students in mind. It is expected, over a short time, that
assistantship opportunities will meet the needs of MSME students.

**Answer to question 3:**
The Committee recognizes the administrative benefit to having the MSME and MSCE programs parallel in requirements. However, the MSME Committee prefers that the MSME be thesis only. Students interested in an applied paper rather than a thesis can pursue the Master of Engineering in Engineering Science degree. It was obvious to the Committee that the reason the MSME offered by the College of Engineering has thesis and non-thesis options is because that College does not offer a Master of Engineering in a related field. Capital College will provide prospective students with a thesis choice – MSME and a non-thesis choice -- M Eng E Sc. Therefore, the non-thesis paper issue is no longer applicable.

Please let me know if you have any additional questions at this time. We plan to submit a Prospectus (our own program) for consideration by Graduate Council (ACGE) ASAP, followed by the submission of the full proposal in fall 2016.

Regards,

*R. Bachnak*

From: "Karen Thole" <kthole@engr.psu.edu>  
To: "R. BACHNAK" <rab65@psu.edu>  
Cc: "Peter J. Butler" <pjbbio@engr.psu.edu>, "Mary Frecker" <mxf36@engr.psu.edu>, KThole@psu.edu  
Sent: Monday, June 20, 2016 5:26:14 PM  
Subject: RE: MS ME proposal

Dear Ray,

Thank you for your helpful answers. I have nothing further at this time. Sounds as if you have some nice facilities.

Karen

Karen A. Thole, Professor and Department Head  
Department of Mechanical and Nuclear Engineering
<table>
<thead>
<tr>
<th>Date</th>
<th>From/To</th>
<th>Subject</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/2016 Graduate School ACGE</td>
<td>Prospectus submitted for the October 25, 2016 ACGE meeting. No feedback or comments received from ACGE members by December 12, 2016.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/2016 Dr. James Nemes, Chancellor and Chief Academic Officer Great Valley</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From: R. BACHNAK [mailto:rab65@psu.edu]
Sent: Monday, December 12, 2016 1:44 PM
To: JAMES A NEMES <jan16@psu.edu>
Subject: consultation -- MS ME proposal

RE: Proposal for MS degree in Mechanical Engineering

Dear James,

We have been working on the development of a new MS program in Mechanical Engineering. Please see the attached proposal. I am writing to seek your input as we are now in the consultation phase. Any feedback that you may be able to provide is very much appreciated. We would appreciate hearing from you by January 12, 2017, if possible. All the best,

Happy Holidays!

Ray

-----------------------------------------------

Rafic A. Bachnak, Ph.D., P.E.
Director, School of Science, Engineering, and Technology
Penn State Harrisburg
777 West Harrisburg Pike
Middletown, PA 17057-4898
Voice: 717-948-6541, Email: rab65@psu.edu

From: "JAMES A NEMES" <jan16@psu.edu>  
To: "R. BACHNAK" <rab65@psu.edu>  
Sent: Wednesday, December 21, 2016 10:18:46 AM  
Subject: RE: consultation -- MS ME proposal

Ray,
No objections. I like the rollout schedule you’ve included in this one. Best of luck with the proposal.

Jim

James A. Nemes, D.Sc.
Chancellor and Chief Academic Officer
Professor of Mechanical Engineering
School of Graduate Professional Studies
Penn State Great Valley
30 East Swedesford Road
Malvern, PA 19355-1443
Phone: 610-648-3335
Fax: 610-648-3377
jan16@psu.edu

12/2016

Dr. Russ Warley,
Director
School of Engineering
Behrend College

From: R. BACHNAK [mailto:rab65@psu.edu]
Sent: Monday, December 12, 2016 1:45 PM
To: RUSSELL LEE WARLEY <rlw27@psu.edu>
Subject: consultation -- MS ME proposal

RE: Proposal for MS degree in Mechanical Engineering

Dear Russ,

We have been working on the development of a new MS program in Mechanical Engineering. Please see the attached proposal. I am writing to seek your input as we are now in the consultation phase. Any feedback that you may be able to provide is very much appreciated. We would appreciate hearing from you by January 12, 2017, if possible. All the best,

Happy Holidays!

Ray

Rafic A. Bachnak, Ph.D., P.E.
Director, School of Science, Engineering, and Technology
Penn State Harrisburg
777 West Harrisburg Pike
Middletown, PA 17057-4898
| From: "RUSSELL LEE WARLEY" <rlw27@psu.edu> |
| To: "R. BACHNAK" <rab65@psu.edu> |
| Sent: Wednesday, January 11, 2017 9:35:44 AM |
| Subject: RE: consultation -- MS ME proposal |

Hello Ray,

Bill Lasher and I took a look at this proposal and we both support it. It looks like a very solid proposal.

Best Regards,
Russ

Russell Warley, Ph.D.
Director, School of Engineering
Chair of Industrial Engineering
Assoc. Prof. of Mechanical Engineering
Penn State Behrend
Burke 242
814-898-6389

---

| From: "R. BACHNAK" <rab65@psu.edu> |
| To: "RUNGUN R NATHAN" <rrn13@psu.edu> |
| Sent: Monday, December 12, 2016 1:45:05 PM |
| Subject: consultation -- MS ME proposal |

RE: Proposal for MS degree in Mechanical Engineering

Dear Rungun,

We have been working on the development of a new MS program in Mechanical Engineering. Please see the attached proposal. I am writing to seek your input as we are now in the consultation phase. Any feedback that you may be able to provide is very much appreciated. We would appreciate hearing from you by January 12, 2017, if possible. All the best,

Happy Holidays!

Ray

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Rafic A. Bachnak, Ph.D., P.E.
Director, School of Science, Engineering, and Technology
Dear Ray,

Thank you for including me in the feedback for your new MSME program. I am excited that you will be able to make this reality and I look forward to helping you and promoting the program among our undergraduates.

I have made some comments in the attached document, but am also listing them here.

1. Page 6. You have mentioned some required ME undergraduate courses as being excluded. There are several tech. electives that Harrisburg offers and will these be counted if the student has taken them? For example ME 461, ME 427 are tech electives that students in Harrisburg BSME program take. How will you handle it if they enroll in the MSME program?

2. Page 6. Do you have a plan in place for a 3+2 BSME + MSME? You may want to either put it in place OR clearly say that this will not be considered now.

3. Page 7. I have marked the courses that are BS ME electives.

4. Page 8. As far as I know PSH has graduate faculty, but all of these are not Penn State graduate faculty. Do you want to make this clear that they can be either to avoid ambiguity.

5. Page 9. (This is personal). I am currently a PSH graduate faculty and would be very happy to get listed here as a possible grad faculty.
6. Page 10. Do you want to make a differentiation between ETAC and EAC based degrees? ETAC do not always take the calculus based courses and so may be at a disadvantage.

7. Page 11. You might want to address if there will be any impact on the BSME program. The faculty you have listed are all teaching BSME courses and if they are going to teach graduate courses, someone has to make up the courses. Addressing this will help.

8. I saw your reply to Karen about lab space etc. In general resident graduate students also need "desk space" and you might want to address this.

Hope the feedback helps. Let me know if there is anything else I can help in to make this proposal go through and also be a part of it.

thanks
rungun

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From: "R. BACHNAK" <rab65@psu.edu>
To: "rungun nathan" <rungun.nathan@psu.edu>
Sent: Tuesday, January 17, 2017 12:48:33 PM
Subject: Re: consultation -- MS ME proposal

Thank you, Rungun, for your feedback and continued support.

We will be updating the proposal to reflect your feedback. I am writing to provide clarification:

#1: If our students are admitted to the MSME program after receiving a BS degree, 400-level courses taken towards the BS degree will not count towards the MSME degree. This may change if (or when) we introduce an IUG program.

#2 and 3: We intend to consider a 3+2 plan (IUG) after the MSME program is in place (two to three years from now). At that time, we will consult with you and others as appropriate.
Sure, we will revise to avoid confusion.

Sure, since you are already on our Graduate Faculty, we should be able to add you to the list and will be in touch with you after the program is approved.

We will revise as appropriate. In addition to an undergraduate degree from a regionally accredited university, applicants will need to meet the stated admission criteria. This applies to both EC and ETAC graduates.

Yes, we plan to hire additional faculty. This will be reflected in the “Graduate Program Cost Analysis Form” that will accompany the submission of the proposal.

Yes, we agree with your assessment. We currently have two research labs that support civil engineering. As the MSME program grows, we are committed to identifying additional lab and desk space to support faculty and students.

Again, your help is very much appreciated. Let me know if you have any further comments at this time. regards,

R. Bachnak
J. APPENDICES

Appendix A. Market Study

The Market Study was completed by the Office of Marketing Research and Communications at Penn State Harrisburg. Survey results follow.

Mechanical Engineering Market Study: Degrees Confirmed and Employment Projections

Degrees conferred

- Private institutions confer a majority of undergraduate and graduate degrees.
- The number of undergraduate and graduate degrees conferred has been increasing since 2008.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public graduates</td>
<td>521</td>
<td>481</td>
<td>457</td>
<td>440</td>
<td>435</td>
</tr>
<tr>
<td>Private graduates</td>
<td>639</td>
<td>603</td>
<td>616</td>
<td>599</td>
<td>593</td>
</tr>
<tr>
<td>Total</td>
<td>1,160</td>
<td>1,084</td>
<td>1,073</td>
<td>1,039</td>
<td>1,028</td>
</tr>
<tr>
<td>Graduate degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public graduates</td>
<td>106</td>
<td>111</td>
<td>116</td>
<td>94</td>
<td>84</td>
</tr>
<tr>
<td>Private graduates</td>
<td>291</td>
<td>242</td>
<td>234</td>
<td>192</td>
<td>143</td>
</tr>
<tr>
<td>Total</td>
<td>397</td>
<td>353</td>
<td>347</td>
<td>286</td>
<td>229</td>
</tr>
<tr>
<td>Total degrees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>conferred</td>
<td>1,557</td>
<td>1,437</td>
<td>1,420</td>
<td>1,325</td>
<td>1,257</td>
</tr>
</tbody>
</table>
Mechanical Engineering Market Study: Degrees Conferred and Employment Projections

Graduate degrees conferred by region

- Currently, there are no institutions in our region (Southcentral) conferring graduate degrees in Mechanical Engineering.

- Nearly all degrees conferred are from institutions in the southeastern (Philadelphia) and southwestern (Pittsburgh) regions of the state.

<table>
<thead>
<tr>
<th>Graduate degrees conferred by region</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
<th>2009</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southeastern</td>
<td>142</td>
<td>114</td>
<td>119</td>
<td>82</td>
<td>90</td>
</tr>
<tr>
<td>Southcentral</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Southwestern</td>
<td>135</td>
<td>114</td>
<td>99</td>
<td>63</td>
<td>53</td>
</tr>
<tr>
<td>Northeastern</td>
<td>43</td>
<td>41</td>
<td>30</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td>Northcentral</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Northwestern</td>
<td>20</td>
<td>15</td>
<td>27</td>
<td>47</td>
<td>18</td>
</tr>
</tbody>
</table>

Employment data

- Among currently employed mechanical engineers, 46% hold a bachelor's degree and 23% hold a master's degree.

- Labor projections indicate continued growth for mechanical engineers across the state, and in our region.

<table>
<thead>
<tr>
<th>Southcentral region</th>
<th>2010 Employment</th>
<th>2020 Projections</th>
<th>Amount of Change</th>
<th>Annual Growth Openings</th>
<th>Annual Replacement Openings</th>
<th>Annual Total Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>10,790</td>
<td>11,840</td>
<td>1,050</td>
<td>104</td>
<td>347</td>
<td>452</td>
</tr>
<tr>
<td>Southcentral region</td>
<td>1,590</td>
<td>1,750</td>
<td>160</td>
<td>16</td>
<td>51</td>
<td>67</td>
</tr>
</tbody>
</table>
Appendix B. Letters of Support

1. John Fetterolf, General Manager, AmstedRail
2. Robert Bylone, Chair, Graduate Technical Advisory Committee
3. Ed Gamber, Vice President of Engineering, Philadelphia Mixing Solutions
4. Kim Ketelsleger, Professor, Structural Engineering Technology, Harrisburg Area Community College
5. Forrest Lysinger, Assistant professor, Engineering and Mechanical Engineering Technology, Harrisburg Area Community College
Appendix C. Faculty Resources

Penn State Harrisburg’s SSET will be fully responsible for staffing courses with qualified faculty, ensuring academic quality, providing academic advising, and other academic responsibilities required for the success of the proposed M.S. ME program. SSET has been delivering graduate programs since the late 1960s, and currently offers six masters programs (thesis and non-thesis). The size of the ME Graduate Faculty has been enlarged to cover key interests represented in area industries that we partner with in research, development, and service activities. There are a total of ten graduate faculty members with specialties in thermodynamics, control systems, material science, manufacturing, solid mechanics and design. The faculty members are:

Ma’moun Abu-Ayyad, Ph.D. (New Brunswick) Associate Professor of Mechanical Engineering
Issam Abu-Mahfouz, Ph.D., P.E. (Case Western Reserve) Associate Professor of Mechanical Engineering, Mechanical Engineering Program Chair
Amit Banerjee, Ph.D. (New Jersey Institute of Technology) Associate Professor of Mechanical Engineering
Richard Ciocci, Ph.D., P.E. (Maryland), Associate Professor of Mechanical Engineering
Ram Goel, Ph.D. (Michigan State) Assistant Professor of Mechanical Engineering
Harris Imadojemu, Ph.D. (North Carolina State) Associate Professor of Mechanical Engineering
Brian Maicke, Ph.D. (Tennessee) Assistant Professor of Mechanical Engineering
AHM Esfakur Rahman, Ph.D. (North Dakota) Lecturer in Mechanical Engineering
Ola Rashwan, Ph.D. (Windsor) Lecturer in Mechanical Engineering
Fariborz Tavangarian Ph.D. (Louisiana State) Assistant Professor of Mechanical Engineering
Rugun Nathan, Ph.D. (Drexel University) Associate Professor of Mechanical Engineering
Appendix D. Laboratory Facilities

The mechanical engineering faculty is responsible for a variety of laboratories. While currently used for undergraduate courses, the labs will be shared with M.S. ME students as needed.

Available Laboratories:

**Vibrations & Controls Laboratory (Room Educational Activities Building 101):** The 1000 ft² lab is used exclusively for mechanical engineering and technology courses including instrumentation, system dynamics, automatic control systems, and industrial robotic applications.

**Thermal/Fluids Laboratory (Educational Activities Building 104):** The 1000 ft² lab is used exclusively for mechanical engineering and technology courses, including fluid flow and heat transfer. A wind tunnel, Rankine cycler, fluid trainer, and refrigeration tester are included in the laboratory.

**Materials Testing Lab (Room EAB 119):** This lab of 1500 ft² is shared with the Civil Engineering programs. This lab will support materials testing with some equipment, such as hardness testers. The primary mechanical courses using this lab are for materials testing.

**Instrumentation Laboratory (Room EL 105):** The laboratory which supports instrumentation consists of six computer stations with various experimentation devices and Labview, is also equipped with Mastercam software that is used for the manufacturing laboratory.

**Welding/Casting Laboratory (Room EL 106):** This space includes MIG and TIG welders, gas and electric furnaces, and a student-built centrifugal caster.

**CNC Laboratory (Room EL 107):** The space allocated for the machine shop facilities is used for manufacturing and capstone project students. The computer numerical control (CNC) facility includes an Accu CNC milling machine, the new Haas turning center, and a Haas Mini-Mill.

**CAD Laboratory (Room EL 109):** This laboratory with 30 student stations is primarily used for all sections of EDSGN 100S. Microsoft Office, SolidWorks, AutoCAD, Creo, Mathematica, MATLAB, COMSOL, ANSYS, and CES are available for the students. The room is equipped with white boards and an instructor computer station, so it also serves as a lecture room for some courses which require computer access for students. When classes are not meeting, students can use the room as an open lab.

**Machine Shop (Room EL 110):** The machine shop is equipped with manual lathes, vertical and horizontal mills, saws, drill presses, and the new tool-room lathe. Manufacturing and capstone project students use many of the shop machines and tools for their designs.

**Additive Manufacturing Laboratory (Room EL 115):** The Uprint 3D printer, MakerBot 3D printer, and 3D scanner are located in this space. Capstone projects use the printer for their
prototypes and final designs. In addition, instructors in other courses such as EDSGN 100S assign printing of conceptual designs.

Garage, Engineering Laboratory Building: This space contains woodworking equipment and indoor room for vehicle modifications. Project students use this space for the construction and testing of their designs.

Whitaker CAD Laboratory (Olmsted 208W): This laboratory with 32 stations is for the exclusive use of the mechanical and civil engineering and technology students. *Microsoft Office, SolidWorks, AutoCAD, Creo, Mathematica, MATLAB, COMSOL, ANSYS, and CES* are available for the students.

Available equipment and instrumentation:

### 1. The Mechanical Engineering Lab Building

**Dock area**
- Powermatic 10 Inch heavy duty pedestal grinder: 353.00
- Clausing Covel Tool grinder machine: 4800.00
- Fairbanks 500 Lb. Cap platform scale: 1100.00
- Plastic injecting machine: 2000.00

**Machine Shop**
- Haas TL-1 Tool Room CNC Lathe: 24000.00
- Grob metal band saw: 5400.00
- Rockwell 8 inch medium duty pedestal grinder: 212.00
- Harvy Butterfly surface grinder with magnetic table: 2640.00
- 3 -Jet 12 inch engine lathes GBH-1340A: each 3470.00
- Southbend 17 inch engine lathe: 8000.00
- Enco 5 inch bench top engine lathe: 470.00
- Ooya Radial arm drill press RE-1225H: 18960.00
- Rockwell radial arm drill press: 2295.00
- Clausing 3 head drill press table: 1500.00
- Rockwell ultra-high speed drill press ¼ “ cap.: 400.00
- Sajo horizontal milling machine: 10000.00
- Magnetic table for mills: 801.00
- Gorton vertical milling machine: 11700.00
- Jet vertical milling machine: 4800.00
- 4-work benches with vises: each 1000.00
- 2- Yausa divider heads for gear cutting: each 1190.00
- 2- Cincinnati divider rotary tables: each 740.00
- Jet pneumatic sheet metal shears mod 1652: 4978.00
- Enco 16 gage sheet metal brake: 840.00
- Heinrich 16 gage bench top hole punch machine: 419.00
- Herman Stone Co. 24 X 36 Granite surface plate: 718.00
Dake 3 ton arbor press, table mounted 455.00
Tapping machine stand 100.00
Wellsaw 10 by 18 in horizontal cutoff saw 4950.00
Speediar air compressor, building air supply 2295.00
Jet-hand notcher mod HN-16N 748.00
Bausch & Lomb optical comparator, manual operation 3820.00
2 ½ ton pallet jack 319.00

**Tool room**

2- Digital surface roughness gage each 1500.00

**CNC Laboratory**

Haas CNC Mini Mill milling machine 31364.00
Haas ST-10y CNC Turning Center with Live Tooling 72000.00
Birmingham Centroid Operated CNC Knee Mill 17500.00
Scherr Tumico Digital optical comparator mod 20-3500 7638.00
Hp laser printer 900.00

**Additive Manufacturing Laboratory**

U-Print 3D printer with material packs and soak tank 23000.00
Makerbot z18 3d printer 6000.00

**Storage**

Assorted waxes for mold making 120.00
9- Flasks with rubber bases each 30.00
Wax injector pot 200.00

**Computer Design Lab**

30 Dell computers for students each 1618.00
Dell computer for instructor with overhead project control 1618.00
DVD/VHS player instructor controlled 300.00
HP high speed printer model 5200 1200.00
28 Drafting/computer tables each 675.00
6 computer only tables, drafting height each 428.00

**Metallurgy Laboratory**

2-Buehler two position polishing tables 3000.00
2- Bausch & Lomb microscopes each 400.00
Reichert microscope 1155.00
Bausch & Lomb microscope 947.00
2- Buehler bench top polishing stands 400.00
2- Ohaus triple beam balances each 200.00
Buehler Co. samples of microscopic grain structures 2000.00
2-chem lab type, heating plates each 500.00
Standard household refrigerator 270.00
<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen Aid mixer</td>
<td>1000.00</td>
</tr>
<tr>
<td>Vacuum pump</td>
<td>875.00</td>
</tr>
<tr>
<td>Enco 10 inch Bell jar</td>
<td>75.00</td>
</tr>
<tr>
<td><strong>Instrumentation Laboratory</strong></td>
<td></td>
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<tr>
<td>Tinius Olsen 300,000 lb. Super “L” upgraded with INSTRON INC. computer interface</td>
<td>112,000.00</td>
</tr>
<tr>
<td>6- lab benches with locking drawers</td>
<td>each 1100.00</td>
</tr>
<tr>
<td>6- Dell computers</td>
<td>each 1474.00</td>
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<tr>
<td>6- Digital Osicascopes</td>
<td>each 1200.00</td>
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<tr>
<td>1- Ohaus 22 lb cap digital scale</td>
<td>266.00</td>
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<tr>
<td>1- Ohaus 4.4 lab. Cap digital scale</td>
<td>266.00</td>
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<tr>
<td>1- Ohaus 72 lb.cap digital scale</td>
<td>100.00</td>
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<tr>
<td>Reaction torque transducers, cable assemblies, LED displays</td>
<td>2520.00</td>
</tr>
<tr>
<td>Arbitrary function generator</td>
<td>4820.00</td>
</tr>
<tr>
<td>Miniature shaker kit</td>
<td>6872.00</td>
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<tr>
<td>Triax force link</td>
<td>4518.00</td>
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<tr>
<td><strong>Welding Laboratory</strong></td>
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<tr>
<td>Hobart stick/TIG welding machine Mod. TG-302</td>
<td>4330.00</td>
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<tr>
<td>Hobart MIG welding machine Mod. RC300</td>
<td>5340.00</td>
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<tr>
<td>Portable MIG welding machine Weld Pack 100</td>
<td>250.00</td>
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<tr>
<td>2- Oxy/Acet torch sets with tanks &amp; cart</td>
<td>each 1000.00</td>
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<tr>
<td>Hypertherm Plasma cutter, ½ inch thickness cap.Max43</td>
<td>1500.00</td>
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<tr>
<td>Welding helmets, standard 20 helmets</td>
<td>each 59.00</td>
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<tr>
<td>Welding helmet auto-darkening</td>
<td>75.00</td>
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<tr>
<td>Cutting goggles 20 pairs</td>
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<tr>
<td>Thermolyne Muffle furnace F-A1730</td>
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<tr>
<td>Sunbeam Gas fired furnace</td>
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<td>2- heavy duty work benches</td>
<td>130.00</td>
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<tr>
<td>2- steel welding tables</td>
<td>199.00</td>
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<tr>
<td>Welding gloves, leather</td>
<td>each 10.00</td>
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<tr>
<td>High temp gloves, glass fiber</td>
<td>each 40.00</td>
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<tr>
<td>Di-Acro Houdaille Metal bender. narrow stock</td>
<td>500.00</td>
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<tr>
<td>canvas curtains- fire restraint</td>
<td>each 37.00</td>
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<tr>
<td><strong>Casting Laboratory</strong></td>
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<tr>
<td>Ecco High frequency generator Gr-8</td>
<td>5600.00</td>
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<tr>
<td>Centrifugual caster—Program built</td>
<td>1000.00</td>
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<tr>
<td>Ecco ceramic crucibles</td>
<td>each 23.00</td>
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<td>Sandblast cabinet—Program built</td>
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<td><strong>Woodworking Laboratory</strong></td>
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<tr>
<td>Craftsman 10” table saw</td>
<td>550.00</td>
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<tr>
<td>Craftsman 3 hp 10” radial arm saw</td>
<td>750.00</td>
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### 1. Room 101 Edu Act Bldg Electrical/Laboratory

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<tr>
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<tr>
<td>Grizzly 15” 3hp planer</td>
<td>995.00</td>
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<tr>
<td>Grizzly 6” x 46” jointer</td>
<td>445.00</td>
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<tr>
<td>Grizzly 14” ¾ hp band saw</td>
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<tr>
<td>Grizzly Combo belt/disc sander</td>
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<tr>
<td>Grizzly 16” variable speed scroll saw</td>
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<td>Grizzly tool table for scroll saw</td>
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<tr>
<td>Craftsman plunge router with table</td>
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<tr>
<td>Milwaukee 14” cut-off machine, chop saw</td>
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<tr>
<td>Dayton 8 inch polishing/ buffer, bench mounted TG80a</td>
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### Automotive Laboratory

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<td>4-Lincoln 2 ton jack stands</td>
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<td>Omega 25 ton hydraulic jack press</td>
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<td>Central Hydraulics 12 ton pipe bender</td>
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<td>2- workbenches</td>
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<td>Power Drive DC-AC inverter</td>
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<tr>
<td>Innovative Motor Sports exhaust analyzer</td>
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### 2. Room 101 Edu Act Bldg Control and Vibrations Laboratory

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<tr>
<td>6- Quanser single robotic arms</td>
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<td>Hydraulic trainer (Explorer II)</td>
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<td>Hydraulic experimental test rig -Program built</td>
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<td>Vibration sensors</td>
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<td>Impulse force hammer</td>
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<td>Digital pressure sensor</td>
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<td>PLC series 30 microcontrollers with Logic master package</td>
<td>5572.00</td>
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<tr>
<td>Data acquisition system (hardware and Labview software)</td>
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<tr>
<td>Matlab for data analysis</td>
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<tr>
<td>Parker Hannifin pneumatic trainer</td>
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<tr>
<td>GS2-22P0 2.0hp AC drive 230V</td>
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<tr>
<td>GS2-11P0 1.0hp AC drive 115VAC</td>
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<td>2-Limit switches ABP2H14Z11</td>
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<td>2-Limit switches ABP2H41Z11</td>
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<tr>
<td>2-Limit switches ABP2H35Z11</td>
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<tr>
<td>Rotary servo plant</td>
<td>7851.00</td>
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</table>

### 3. Room 104 Edu Act Bldg Thermal /Fluids Lab

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<tr>
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<tr>
<td>Low velocity wind tunnel –Program built</td>
<td>2000.00</td>
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<tr>
<td>Water Tunnel - Program Built</td>
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<tr>
<td>Hampden Fluid Flow trainer H-6925-CDL</td>
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<td>Hampden Refrigerator trainer H-6710-CDL</td>
<td>41985.00</td>
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<td>Turbine Technologies Rankine Cycler trainer</td>
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<tr>
<td>Gilkes Plenum wheel turbine trainer</td>
<td>4000.00</td>
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<tr>
<td>Armfield Hydraulic Trainer Bench with Free and Forced</td>
<td>27000.00</td>
</tr>
<tr>
<td>Item</td>
<td>Cost</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<tr>
<td>Vorticies, Impact of a Jet, and Centrifugal Pump</td>
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<tr>
<td>Characteristics Modules</td>
<td>16,000.00</td>
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<tr>
<td>Reciprocating air compressor</td>
<td>5660.00</td>
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4. **Room 119 EAB Materials Testing Lab**

- MTS 100”kps” Universal Tester                                      | 190000.00|
- Tinius Olsen Impact tester                                         | 3800.00   |
- 5- Rockwell standard hardness testers                               | each 1100.00|
- Tinius Olsen air Brinnel hardness tester                           | 3800.00   |
- Heat treatment furnace, dual chamber                                | 2000.00   |
- 6- Hand held thermocouple readers, Omega                           | each 500.00|
- 2- bench top tensile/ hardness testers                             | each 3000.00|
- Detroit torsion tester                                              | 3400.00   |
- 2- Rotary fatigue testers                                           | each 11,900.00|
- Tube Furnace with Vacuum pump                                       | 4000.00   |
- (118) Makerbot z18 3d printer                                      | 6000.00   |
- Makerbot mini 3d printer                                            | 2800.00   |
- Extruderbot plastic extruder                                        | 1200.00   |

5. **Room 209 Edu Act Bldg Research Lab**

- Vision Engineering optical measuring machine                       | 37880.00 |
Appendix E. Computing Resources

Information Technology Services (ITS) provides leadership and support for all classroom, laboratory, collaborative learning spaces and office computers, peripherals, and networks. All campus computers are loaded with technical and professional software that support the mechanical engineering program. The University maintains many site licenses for popular packages that are made available to students, faculty, and staff in all labs and in offices by request. Microsoft Office is available on all campus computers. Software updates are centrally maintained and are automatically pushed out to the devices when new versions are available or a vulnerability needs to be addressed. Hardware updates are nominally three years for a laptop and four for a desktop. ITS also maintains a wireless network on campus for laptop users and those with BYOD devices. Students are able to access the network from all buildings on campus, independent of the platform they choose to use.

Up-to-date equipment, computers, and programs available to mechanical engineering students enable the program faculty to assist students in preparing to work in the mechanical field in industry and government. Program Objectives include potential work sites and type of work that ME CA graduates should be qualified to do. In part because of the equipment and facilities, the faculty is able to deliver courses that challenge students to solve mechanical problems in a work-related environment. Showing students how to deal with the mechanical world beyond textbooks is a proactive approach to having them commit to lifelong learning.

General computer support: Mechanical engineering students have access to a variety of computer labs across campus. The Olmsted Building and the Library have teaching labs that are open to all students when classes are not meeting. Olmsted has a suite of four labs in the basement plus four other labs spaces while the Library has three large labs. Numerous other small labs and collaboration spaces can be found around campus. (see the end of this document for a full listing of collaborative learning spaces)

ITS @ PSH provides a wide range of computing resources and services to students at the Penn State Harrisburg campus, with additional resources and services provided through the ITS group at the University Park campus.

Computer Labs: ITS provides and/or supports 20 Computer Labs with a total of more than 950 computers (approximately 850 PCs, 70 Macs, and 30 Linix). All Computer Labs include an instructor station with a projector. Users in these rooms have access to all the software resources of the University and the Internet. The majority of the Computer Labs are for public use by any faculty member, staff member, or student. A handful of specialized labs restrict access to subsets of students, e.g., EET students, Chemistry students, CAD students, or others. Lab hours vary depending on the lab and depending on access restrictions. Restricted-access labs generally have a physical access control system allowing access to authorized students at any time the building is open. The Labs may be scheduled for classes as available.

Technology Enhanced Classrooms: ITS provides and/or supports more than 75 computer-fronted classrooms. Each classroom includes an instructor machine, projector, DVD, and podium. Using these rooms, instructors have access to all the resources of the University and the Internet and can project their computer display to the entire class. The rooms may be scheduled for classes as available.
Computer Software: Computer users at PSH have access to a full range of general software such as the Microsoft Office Suite (Word, Excel, PowerPoint), email, web browsers, Adobe Reader, media players, Doceri, and much more. ITS @ UP provides blogging, web-hosting, podcasting, and other advanced services. Specialty labs include curriculum-specific software installed at the request of the faculty. Students at PSH also have access to high-end graphics workstations for digital photography and digital video through the resources of the Media Commons.

Desktop Computing: Essentially all faculty and staff members at PSH have a desktop computer. Many faculty and some staff members also have laptop computers. All machines have access to the full range of software discussed above.

Computer Security: All machines on the PSH campus which conform to ITS guidelines receive regular Windows security updates and are configured with Symantec Antivirus and regularly updated. Individual PCs are backed up regularly and offsite backups are created nightly using University Park facilities. Spam filtering is provided as a central service of ITS @ UP. The University is protected from external networks by a high-end firewall system, and within the University, administrative (faculty and staff) machines are protected from academic (public and student-oriented) machines by an internal firewall.

ITS @ Harrisburg/John D. Hoh/Campus Technology Officer

Collaborative/Active Learning Spaces – **bold is a new space**

November, 2016

Library 203 (32 seats) – Multiple projection screens, Ultra-light portable marker boards, four tables with a Media Scape and a laptop.

Library 305 (20 seats) - Flexible seating (node chairs), Ultra-light portable marker boards

**Library 202e and 202d** – Flexible seating for 50

Library 201C - One Button Studio Room. 1 PC, Camera to record actions

Library first floor – many collaborative study rooms/spaces for group work

Olmsted E252 (24 seats) – Dual Flat Screens, Flexible Seating, Ultra-light portable marker boards

Olmsted E253 (40 seats) – Dual Projectors, Flexible Seating, Ultra-light portable marker boards

**Olmsted E264 (36 seats)** - Dual Flat Screens, Flexible Seating, Ultra-light portable marker boards

Olmsted E334 (25 seats) - Dual Flat Screens, Computers at each seat, collaborative group seating

**Olmsted E306 (26 seats)** - Dual Flat Screens, Flexible Tables, portable marker boards, Polycom Video Conferencing option.
Olmsted C8 Lounge – 3 All-In-One PCs, scanner, collaboration/group study (media scape) with VGA video/audio connections for up to four devices, another Large LCD with multiple ports, and an apple TV
EDUC ACT 217 Computer Lab - 9 PCs, collaboration seating, white boards and large LCD TV
EDUC ACT Lounge – Computer with Printer, collaborative tables and whiteboard
EAB 2nd floor lounge – collaborative seating with glass whiteboards
Active Learning Spaces in the near future (Summer 2017) will include:
*Olmsted E308 (26 seats) - includes Polycom Video Conferencing – clone of E306
Olmsted E265 (36 seats) – similar to E264*
Appendix F. Library Resources

The Library is a state-of-the-art facility that opened in January 2000. This 115,000 square-foot building features: seating for 735 users, Internet access (wireless or wired) at 100% of the general purpose seats, technology-enhanced classroom, library instruction lab, two seminar rooms, 14 group study rooms, a Cybercafé, and collection growth capacity for 20 years.

The Harrisburg Campus is home to the second-largest library, in terms of number of materials, among the Penn State University Libraries system. The facility houses a collection of more than 300,000 total volumes and nearly 1,300,000 microforms (microfiche, microfilm, and microcard). It maintains current subscriptions to more than 600 periodical titles. Other materials in the library collection include: videos (DVD), audios (CD-ROM and LP), technical reports, industry standards, theses, and some dissertations.

All employees and students have access, regardless of location, to more than 749 databases, many of which also provide access to the full-text of more than 110,000 cited publications. Students may access the more than 7.2 million books and 444,358 e-books. All electronic resources are licensed and provided by the Penn State University Libraries and Department for Information Technologies. A sampling of the resources available include, but are not limited to: ACM Portal (computer science), American Society for Testing and Materials (standards), ASCE Online Journals (civil engineering), ASME Online Journals (mechanical engineering), CHEMnetBASE (chemical reference works), Compendex (all engineering disciplines), ENGnetBASE (engineering handbooks), Environmental Sciences (environmental engineering), IEEE Xplore (electrical engineering), Knovel (engineering and science reference books), Mechanical Engineering Abstracts (mechanical engineering), INSPEC (computer science and electronics), NTIS (government-sponsored engineering and science reports), Safari (computer manuals), and SciFinder Scholar (chemistry and physics). In addition technical manuals are available in the open stacks or on reserve (print and electronic). Trade magazines are available in the current and bound periodicals areas and electronically, where a University-wide subscription exists. Specifications are available in the open stacks, and electronically where a University-wide subscription exists.

At present, students and employees access computerized databases and information sources from wherever they have access to the Internet, including both within and outside the library. Within the library, students have access to 74 general purpose, 35 classroom, and 39 lab computers. Outside the library, students and employees have access from campus offices, classrooms, laboratories, and residence facilities via the Penn State University-wide area network. Students and employees also have access to all electronic resources from commercial Internet providers, provided they have a valid Penn State Access Account username and password.

The library is open for walk-in use 92 hours per week during the spring and fall terms and 68 hours during the summer session. A cybercafé, located inside the library and equipped with computers, study seating, and vending machines, is open for student use 24 hours a day. The electronic resources and services are accessible 24 hours a day, seven days a week.
A comprehensive array of services is provided. They include: reference assistance, research consultation, course-related instruction, loaner laptops, group study room reservations, electronic reserves, interlibrary loan, electronic resources workshops, faculty purchase recommendations, photocopiers, multimedia equipment, and collection development.

There are six professional librarians, 10 full-time staff, and 6 FTE student assistants. All professional librarians hold a graduate degree from an institution accredited by the American Library Association. One librarian is a Ph.D. candidate and two others possess a second masters.
Graduate Council
Program, Option, or Minor Proposal Form

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

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

College/School: College of Agricultural Sciences
Department or Instructional Area: Plant Science

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: Agronomy
Current designation of graduate option: International Agriculture and Development
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): Agronomy Graduate Program is adding option of a dual title degree; International Agriculture and Development

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

Submitted by Graduate Program Head

Erin Connelly  
Printed name
Signature  
Date: 2/16/17

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

John Ewing  
Printed name
Signature  
Date: 4/11/17

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

Rama Radhakrishna  
Printed name
Signature  
Date: 4/12/17
**Recommended by Chair, Graduate Council Subcommittee on New and Revised Programs and Courses:**

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**Recommended by Chair, Graduate Council Committee on Programs and Courses:**

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**Noted by Dean of the Graduate School:**

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Proposal to Adopt a Dual-Title Degree Program

INTERNATIONAL AGRICULTURE AND DEVELOPMENT (INTAD)

College of Agricultural Sciences

Agronomy Graduate Degree Program
Department of Plant Science
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>Justification</td>
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<td>Course Efficiencies</td>
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Justification

Food production is essential to human existence. As the world population continues to grow, however, providing adequate supplies of food in ways that are sustainable has become increasingly challenging. The discipline of Agronomy can make a critical and unique contribution to addressing this issue, because it combines fundamental research with applied aspects in key areas including plant genomics, plant breeding, plant physiology, plant production and weed management.

Thus the Agronomy graduate program is dedicated to training future agronomists capable of increasing fundamental knowledge about and finding solutions to issues of food and animal production and ecosystem services. Specifically, the program emphasizes research that increases the efficiency of production of agronomic crops; improves the quality of food, feed, and fiber; assists in the use and development of land resources; develops an understanding of the basic plant-animal climate complex; and improves the overall quality of the human environment.

Agronomy faculty and the Agronomy graduate degree program were part of Penn State’s Crop and Soil Sciences Department until mid-2012, when Agronomic scientists merged with Horticulture scientists to form the Department of Plant Science. This new unit further strengthens the integration of Agronomy with other disciplines focused around the plant sciences, all of which have a strong connection to sustainable crop and animal production systems. Further, its combination of resources offers critical skills for meeting the food needs of a growing world population, especially in developing countries. It is part of a much larger effort involving scientists on all continents who recognize the need to expand food (and fiber) production.

Indeed, there is growing awareness of the importance of agronomy in addressing the world’s food supply challenges. International development agencies both public and private and corporations hire agronomists for this work in growing numbers. As a result, Agronomy graduate program applicants are increasingly expressing a desire for international experience. Such work requires additional skills, which are not currently addressed in the Agronomy curriculum. They are particularly interested in the possibility of the INTAD dual title degree program, which recognizes the importance of food production and ecosystem services to human welfare throughout the world. Penn State’s International Agriculture and Development program, whose primary purpose is to enlighten students about educational cultures, practices, and philosophies around the world, offers a vital addition to study opportunities in this arena.

The primary goal of the Agronomy-INTAD dual title degree program is to produce agronomists with skills, credentials and experience to address issues related to crop production and ecosystem services throughout the world. It will provide an important vehicle for Agronomy students to interact with Agronomists from across the globe in addressing these issues, allowing them to gain first-hand experience in the application of their discipline to current and future food supply challenges.
In the process, it will equip students with a greater degree of understanding of the intellectual and academic advantages and benefits of interdisciplinary study. Further, it will provide the integration of research credentials from Agronomy and education, extension, and economic and social science credentials from other partners in INTAD.

As a result, students graduating from this dual-title graduate degree program will be well positioned to compete for the best jobs at international organizations and agencies, as well as universities, national organizations and agencies and multi-national corporations. Compared with graduates of other universities, Penn State Agronomy graduates will have documented skills in international issues. These credentials will give them a competitive advantage in the job market. The appearance of the dual-title on the diploma and transcript will instantly draw attention to the graduate’s unique graduate program.

At the departmental level, the dual-title degree will strengthen the relationship between Agronomy, the Office of International Programs, and other units at the University. Activities such as service by faculty on graduate committees, Agronomy graduate students taking social science and internationally-oriented courses, and the likely attraction of students from other participating departments and programs to courses and research problems in the College of Agricultural Sciences will create bridges between Colleges. This will stimulate new research and teaching partnerships.

Institutionally, the dual-title degree will provide additional benefits. Senior university leaders increasingly promote interdisciplinary and international collaborations as a general focus for Penn State’s future. The Dean of the College of Agricultural Sciences has also endorsed the College’s strategic plan that calls for increased international collaboration.
# Course Efficiencies

## Degree Requirements with Comparison Table

### Comparison of Agronomy Master of Science Program to INTAD Master's Program

<table>
<thead>
<tr>
<th>Advisory Committee</th>
<th>Master's Degree in Agronomy</th>
<th>Master's Dual-Title in AGRO plus International Agriculture and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At least three faculty, all who are members of the Graduate Faculty. One member must be from outside the department. If a minor is selected, one member must be from the minor department</td>
<td>Adviser or co-adviser must be on INTAD faculty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Master's Degree in Agronomy</th>
<th>Master's Dual-Title in AGRO plus International Agriculture and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agro 501 Graduate Study Dialogue (1 cr)</td>
<td>AEE 450 (3 cr)</td>
</tr>
<tr>
<td></td>
<td>Agro 590 Seminar (1 cr)</td>
<td>CEDEV 505 (3cr)</td>
</tr>
<tr>
<td></td>
<td>Agro 555 Effective Scientific Communication (2 cr)</td>
<td>INTAD 820 (3 cr)</td>
</tr>
<tr>
<td></td>
<td>Major Field 4XX or 5XX (12 cr); at least 6 of the 12 credits must be 5XX level course work excluding seminar or independent studies.</td>
<td>Independent study/research/teaching/internship with international development content (3 cr)</td>
</tr>
<tr>
<td></td>
<td>Statistics 5XX course (3 cr)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor/general studies courses 4XX or 5XX (6 cr)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agro 600 Thesis Research (6 cr)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agro 602 Supervised Teaching (1 cr). Although Agro 602 is a requirement for the M.S. in Agronomy, the 1 cr cannot be used to count towards the 30 credit minimum required for the M.S. degree.</td>
<td></td>
</tr>
<tr>
<td>Final Oral Examination</td>
<td>Each M.S. degree student must complete a final oral examination consisting primarily of defense of the thesis research. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass the thesis defense.</td>
<td>The student’s research topic must reflect both the primary degree (AGRO) and the INTAD dual-title program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Comparison of Agronomy Ph.D. Program to INTAD Ph.D. Program</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ph.D. Degree in Agronomy</strong></td>
<td><strong>Ph.D. Dual-Title in AGRO plus International Agriculture and Development</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Doctoral Committee</strong></td>
<td>At least four faculty, all of whom are members of the Graduate Faculty. At least one member must be from outside the department. The committee is only appointed after the candidacy examination has been passed.</td>
<td>One member, including the chair or co-chair, must be a member of the INTAD Graduate Faculty</td>
</tr>
</tbody>
</table>
| **Course Requirements** | Students must complete 55-60 credits of formal coursework beyond the baccalaureate, plus additional seminar, teaching and research credits. A minimum of 12 credits of 500 level formal courses beyond the BS degree is required. Courses will be chosen by the student and dissertation advisor in consultation with the advisory committee. | R SOC 517 (3 cr)  
R SOC 508 (3) or R SOC 555 (3)  
INTAD 820 (3 cr)  
Additional courses from the INTAD list (6 cr)  
Independent study/research/teaching/internship with international development content (3 cr) |
<p>|  | Agro 501 Graduate Study Dialogue (1 cr) |  |</p>
<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agro 590 Seminar (two required) (1 cr)</td>
<td>Statistics course (6 cr) of which a minimum shall be 500 level.</td>
</tr>
<tr>
<td>Agro 600 Thesis Research (12 cr)</td>
<td>English communication skills and related studies (6 cr). Options include: (1) One 3-cr 400 or 500 level course of advanced English technical composition; (2) 3 cr of a 400 or 500 level course chosen from a department-approved list of courses; (3) 3 cr of a 400 or 500 level writing intensive course.</td>
</tr>
<tr>
<td>Agro 602 Supervised Teaching (2 cr)</td>
<td>Agro 602 is a requirement for a Ph.D. in Agronomy, these 2 cr will not be used to count towards the normal 55-60 credits of formal coursework beyond the baccalaureate degree.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Requirement</th>
<th>Participate in resident education or extension teaching activities for the equivalent of at least two semesters. Agro 602 (2 cr)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Candidacy Examination</th>
<th>The exam will consist of presenting a scientific journal article and answering questions by committee members relevant to the student’s program.</th>
</tr>
</thead>
</table>

The candidacy examination committee must include at least one Graduate Faculty member from INTAD. The candidacy exam must include an INTAD component. In accordance with Graduate Council policy, the candidacy examination may be delayed one semester beyond the normal period allowable. Doctoral students must be admitted into the dual-title degree.
<table>
<thead>
<tr>
<th>Program in INTAD</th>
<th>Ability to read, write, and speak English will be assessed during the candidacy examination.</th>
<th>Candidates must be fluent in reading, writing, and speaking English.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Competency Assessment</td>
<td>Written and oral exam of a nature determined by the doctoral committee.</td>
<td>International agriculture must be a key topic in the comprehensive exam. The INTAD representative on the doctoral committee will develop questions for and participate in the evaluation of the comprehensive examination.</td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td>Each Ph.D. degree student must complete a final oral examination consisting primarily of defense of the dissertation research. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School, and the student must pass the final oral examination (the dissertation defense).</td>
<td>The student’s research topic must reflect both the primary degree (AGRO) and the INTAD dual-title program.</td>
</tr>
</tbody>
</table>
PROGRAM STATEMENT: BULLETIN COPY

Revised Bulletin Copy

Agronomy

Erin Connolly, Head of the Department of Plant Science
116 Agricultural Sciences & Industries Building
814-865-2025

Peter Landschoot, Director of Graduate Studies in Agronomy
116 Agricultural Sciences & Industries Building
814-863-1017

Degrees Conferred:

Ph.D., M.S.
Dual-Title M.S. in Agronomy and International Agriculture and Development
Dual-Title Ph.D. in Agronomy and International Agriculture and Development

The Graduate Faculty

- Surinder Chopra, Ph.D. (Univ. of Brussels) Professor of Maize Genetics
- William Curran, Ph.D. (Illinois) Professor of Weed Science
- Michael Fidanza, Ph.D. (Maryland) Courtesy Professor of Turfgrass Science
- Marvin Hall, Ph.D. (Minnesota) Professor of Forage Management
- David Huff, Ph.D. (Michigan State) Professor of Turfgrass Breeding and Genetics
- John E Kaminski, Ph.D. (Maryland) Associate Professor, Turfgrass Management
- Heather Karsten, Ph.D. (Cornell) Associate Professor of Crop Production / Ecology
- Armen R. Kemanian, Ph.D. (Washington State) Associate Professor of Production Systems and Modeling
- Peter Landschoot, Ph.D. (Rhode Island) Professor of Turfgrass Science
- Dawn Luthe, Ph.D. (Wisconsin) Professor of Plant Stress Biology
- Jonathan Lynch (U.C. Davis) Professor of Plant Nutrition
- Ben McGraw (Rutgers) Assistant Professor of Turfgrass Science

- Andrew McNitt, Ph.D. (Penn State) Professor of Soil Science
- David Mortensen, Ph.D. (North Carolina) Professor of Weed Ecology
- Gregory Roth, Ph.D. (Penn State) Professor of Agronomy
- Max Schlossberg (Georgia) Associate Professor of Turfgrass Nutrition and Soil Fertility
- Jessica Williamson (Kentucky) Assistant Professor of Forage Management
The Agronomy program is administered in the Department of Plant Science, College of Agricultural Sciences. Each student will be associated with an adviser who may provide financial support, research facilities, and/or office space. Applicants are encouraged to explore, study, and research opportunities by contacting faculty who may be prospective advisers.

This program provides opportunities for candidates interested in Agronomy to become a professional leader and an independent scholar. Faculty in this program are competent to prepare candidates in the subfields of Agronomy including: plant ecology, plant genomics, plant breeding, plant physiology, and field and forage crop management.

**Admission Requirements**

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](#).

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

Prerequisites for major work in Agronomy vary with the area of specialization and the degree sought, but courses in chemistry, mathematics, physics, geology, basic and applied biological sciences, and English communication skills are required. A baccalaureate degree in basic or applied natural sciences is preferred for M.S. degree applicants.

A minimum junior/senior grade-point average 3.00 (on a 4.00 scale) is required in all courses in the biological and physical sciences regardless of when taken. Exceptions to these requirements may be made for students with special backgrounds, abilities, and interests.

**Master’s Degree Requirements**

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

A minimum of 31 credits at the 400, 500, 600, or 800 level is required, with least 18 credits at the 500 and 600 level, combined, including:

- 12 credits of 400- or 500-level formal courses in the major field (at least 6 credits at the 500-level)
- 6 credits of 400- or 500-level formal courses in a minor or general studies area
- 3 credits in statistical methods at the 500-level
- AGRO 501 (1 cr.)
- AGRO 555 (2 cr.)
- AGRO 590 (1 cr.)
- 6 credits of thesis research (AGRO 600 or 610)

Students are required to participate in AGRO 590 each semester they are registered, but can only count a maximum of 1 credit of AGRO 590 towards the degree. In addition, M.S. students are required to complete 1 credit of Supervised Experience in College Teaching (AGRO 602); however, this 1 credit cannot be counted towards the degree requirements. The remaining elective credits may be chosen from a list of approved electives maintained by the program office.

The thesis must be accepted by the advisory committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

**Doctoral Degree Requirements**

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

While a minimum number of courses for the degree is not specified, the doctoral advisory committee has the responsibility of specifying courses and credits essential for the education and development of the candidate. Students are expected to be educated in depth in a specific subfield of agronomy and to have a perspective of the general field. Normally, 55 to 60 credits in formal course work beyond the B.S. degree are required including:

- 12 credits of 500-level formal courses beyond the B.S. degree
- A minor or general studies course work
- 6 credits in statistical methods beyond the B.S. degree, of which a minimum of 3 credits must be at the 500 level
- AGRO 501 (1 cr.)
- AGRO 590 (1 cr.)
- 12 credits of dissertation research (AGRO 600 or 610)

Doctoral candidates are required to participate regularly in a departmental seminar and to register for at least 2 credits of the seminar during the Ph.D. program. However, only 1 credit of AGRO 590 can be counted towards the degree. In addition, Ph.D. students are required to complete 2 credits of Supervised Experience in College Teaching (AGRO 602); however, these 2 credits cannot be counted towards the degree requirements.
The communication requirement for the Ph.D. degree may be met by completing at least 6 credits of course work in an area of English communications approved by the student's doctoral committee.

Every student has a close professional relationship with his or her faculty adviser. While research that is done for the thesis will be on subjects that fall within the ongoing research program of the adviser, students are encouraged to propose research projects that are of interest to them. The department encourages professional development of students through participation in meetings of relevant professional societies and organizations.

**Dual-Title Graduate Degree in Agronomy (AGRO) and International Agriculture and Development (INTAD)**

Graduate students with research and educational interests in international agriculture may apply to the dual-title degree program in Agronomy and International Agriculture and Development. The goal of the dual-title degree in AGRO and INTAD is to enable graduate students from AGRO to acquire the knowledge and skills of their primary area of specialization in AGRO, while at the same time gaining the perspective and methods needed for work in the international agriculture. Graduate study in this program seeks to prepare students to assume leadership roles in science, engineering, outreach, and project management anywhere in the world. Students acquire a broad perspective on how to apply their research findings in the context of the broader international community. Thus, the dual-title will allow students to master their field of specialization from an international perspective so that they can effectively engage in agricultural development activities within various countries and regions.

**Admission Requirements**

Students must apply and be admitted to the graduate program in AGRO 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 be admitted into the dual-title degree program in INTAD prior to obtaining candidacy in their primary graduate program.

**Degree Requirements for AGRO/INTAD Dual-Title M.S.**

To qualify for the dual-title degree, students must satisfy the degree requirements for the M.S. degree, listed above. In addition, students must complete the degree requirements for the dual-title M.S. in INTAD, listed on the INTAD Bulletin page. Up to 6 credits of INTAD approved courses can be applied to fulfilling AGRO program
requirements. Final course selection must be approved by the student’s advisory committee.

**Degree Requirements for AGRO/INTAD Dual-Title Ph.D.**

To qualify for the dual-title degree, students must satisfy the degree requirements for the Ph.D. degree, listed above. In addition, students must complete the degree requirements for the dual-title Ph.D. in INTAD, listed on the [INTAD Bulletin page](#). Some courses may satisfy both AGRO program requirements and those of the INTAD program. Up to 6 credits of INTAD approved courses can be applied to fulfilling AGRO program requirements. Final course selection must be approved by the student’s committee.

The candidacy examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from AGRO and must include at least one Graduate Faculty member from the INTAD program. Faculty members who hold appointments in both programs’ Graduate Faculty may service in a combined role. There will be a single candidacy examination, containing elements of both AGRO 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 on semester beyond the [normal period allowable](#).

In addition to the [general Graduate Council requirements for doctoral committees](#), the doctoral committee of an AGRO and INTAD dual-title Ph.D. student must include at least one member of the INTAD Graduate Faculty. Faculty members who hold appointments in both programs’ Graduate Faculty may service 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 in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their doctoral committee and reflects their original research and education in AGRO 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 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.

**Bulletin Copy – INTAD (additions highlighted)**

International Agriculture and Development  
MELANIE MILLER FOSTER, Assistant Professor  
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814-863-8642; ljensen@psu.edu

**Degrees Conferred**

Students electing this degree program through participating programs will earn a degree with a dual-title at the Master's or Ph.D. level. Students receive a degree that lists their major program and International Agriculture and Development (INTAD).

The International Agriculture and Development (INTAD) program is offered through the Departments of Agricultural Economics, Sociology, and Education, Entomology, Environmental Systems Management, Plant Pathology and Environmental Microbiology, and Plant Sciences. The dual-title degree enables qualified students from the College of Agricultural Sciences (CAS) and other select programs at Penn State to combine their major degree with an internationally focused program of study to gain global competency skills and techniques for application of their discipline in a global environment.

The following graduate programs offer the dual-title in INTAD: M.S. and Ph.D. in Agricultural and Extension Education (AEE), M.S. and Ph.D. in Agricultural Environmental, and Regional Economics (AEREC), **M.S. and Ph.D. in Agronomy (AGRO)**, M.S. and Ph.D. in Entomology (ENT), M.S. and Ph.D. in Plant Pathology (PPATH), M.S. and Ph.D. in Rural Sociology (RSOC), and M.S. and Ph.D. in Soil Sciences (SOILS).

**The Graduate Faculty**
The Program
The INTAD dual-title graduate degree program is administered by the INTAD- Academic Program Management Committee. The committee maintains the curriculum, identifies courses appropriate for the program, and develops and recommends policy and procedures for the program’s operation to the dean of the College of Agricultural Sciences and the dean of the Graduate School. Members of the Graduate Faculty in INTAD also serve on master’s and doctoral committees for students who are accepted into the dual-title program. This dual-title program enables students to learn about international agriculture while maintaining a close association with their primary area of interest in their home department.

Admission Requirements
Students must apply and be admitted to their primary graduate program and The Graduate School before they can apply for admission to the INTAD dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of INTAD dual-title program. The student will submit an application to the INTAD Academic Program Committee. The application will include a written personal statement indicating the career goals they hope to accomplish by earning a dual-title degree. Doctoral students must be admitted into the dual-title degree program in INTAD prior to obtaining candidacy in their primary graduate program.

Degree Requirements
To qualify for the INTAD dual-title degree, students must satisfy the requirements of the primary graduate program in which they are enrolled. In addition, they must satisfy the minimum requirements of the INTAD dual-title degree specified here.

Graduates of the dual-title INTAD master's degree program who wish to pursue an INTAD doctoral degree must re-apply to the INTAD program for admission. INTAD master's degree credits may be carried over to the doctoral program. Six additional INTAD credits will be required. INTAD master's degree graduates who pursue an INTAD Ph.D. are required to take the INTAD 820 International Agricultural Development Seminar a second time.

Master's Degree
Course Requirements
Students are required to complete a minimum of 12 INTAD course credits (400, 500, or 800) for a dual-title Master's degree. Nine credits will form the core curriculum: INTAD 820 (3 cr.), AEE 450 (3 cr.), and CEDEV 505 (3 cr.). The remaining three credits must be taken as an internship or applied course/independent study with international development content.

Final course selection is determined by the students, their major program advisors and their INTAD advisers. These advisors will discuss with the student a program of study
that meets the student's career goals and that is in accord with the policies of the Graduate Council and the INTAD dual-title program. Some courses may satisfy both the major graduate program requirements and those of the INTAD dual-title program.

**Thesis**

Students pursuing a M.S. degree that requires a master's thesis, in addition to the 12 credits specified above, must write the thesis on a topic that reflects both their primary graduate program and the dual-title in INTAD. At least 6 thesis research credits (600 or 610) must be taken in the student’s primary graduate program.

All members of the student’s committee for the dual-title master's degree will be members of the Graduate Faculty. The committee must include at least one Graduate Faculty member from INTAD.

**Ph.D. Degree**

Students admitted to the doctoral INTAD dual-title offering must exhibit high research competence, including ability to identify, conceptualize, and execute a significant research project that makes a significant addition to the body of knowledge in the field. Students also must be fluent in reading, writing, and speaking English.

**Course Requirements**

Students are required to complete a minimum of 18 INTAD credits for a dual-title Ph.D. degree. The 18 required credits must be at the 500 or 800 level. Nine credits will form the core curriculum: INTAD 820 (3 cr.), R SOC 517 (3 cr.), and either R SOC 508 (3 cr.) or R SOC 555 (3 cr.). The remaining 9 credits must be taken from among INTAD electives. In addition, they will be encouraged to pursue proficiency in a language other than English, as appropriate.

Final course selection is determined by the students and their doctoral committees. The doctoral committee will discuss with the student a program of study that meets the student’s career goals and that is in accord with the policies of the Graduate Council and the INTAD dual-title program. Some courses may satisfy both the major graduate program requirements and those of the INTAD dual-title program. Permission from a student's doctoral committee, in consultation with the program chair, is required to substitute a 400-level course for a 500-level course.

**Candidacy**

The candidacy examination committee for the dual-title Ph.D. degree must include at least one Graduate Faculty member from 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 the primary graduate degree program 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.
Committee Composition
In addition to the general Graduate Council requirements for doctoral committees, the doctoral committee of an 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.

Comprehensive Exam
At the end of their coursework, students must complete a comprehensive examination that follows the guidelines established by the primary program and reflects both their primary program and the dual-title degree curriculum. International agriculture must be one of the key areas of the exam and the INTAD representative on the student’s doctoral committee must have input into the development of and participate in the evaluation of the comprehensive evaluation.

Dissertation and Dissertation Defense
Doctoral students enrolled in the dual-title degree program are required to write and orally defend a dissertation on a topic that reflects their original research and education in both their primary program and the INTAD dual-title program. The dissertation should contribute to the body of knowledge in international agriculture. A public oral presentation of the dissertation is required. The dissertation must be accepted by the doctoral committee, the head of the graduate program, and the Graduate School, and the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree.

Student Aid
Graduate Assistantships and other forms of student aid are described in the Student Aid section of the Graduate Bulletin. A limited number of Research Assistantships are also available through the CAS. 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 400-499 may be used to meet some graduate degree requirements when taken by graduate students but courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up for deficiencies or to fill in gaps in previous education but may do not meet requirements for an advanced degree.
February 5, 2017

To The Graduate Council Joint Curricular Committee:

This letter is to indicate support for the application from the Agronomy program to participate in the International Agriculture and Development (INTAD) dual-title graduate program.

Agronomy joins the six graduate programs that have previously adopted the INTAD dual-title: Rural Sociology, Agricultural, Environmental and Regional Economics, Entomology, Agricultural and Extension Education, Soils, and Plant Pathology.

The Agronomy program has long been committed to international study and research and INTAD expands on this, particularly as the issue of climate change has emerged as a defining issue in international development. Graduates from Agronomy will be better equipped with the contextual knowledge and skill set that will help them translate their skills in a variety of international settings around the world.

Thank you for your consideration of this proposal.

Sincerely,

Leif Jensen

Edwin Rajotte

International Agriculture and Development (INTAD) Co-Chairs
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: School of International Affairs
Department or Instructional Area:

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: _________________________
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): Change in course numbering of two core courses.

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

Submitted by Graduate Program Head
Scott Sigmund Garner
Printed name
Signature
Date: 3/23/16

Noted by College/School Representative to Graduate Council Subcommittee on New and Revised Programs and Courses:
Flynt L. Leverett
Printed name
Signature
Date: 3/23/16

Approved by College/School Dean/Chancellor (or Designee):
James W. Houck
Printed name
Signature
Date: 3/24/16
Recommended by Chair, Graduate Council Subcommittee on New and Revised Programs and Courses:

On Behalf of John Challis
Printed name
Signature
Date: 01/23/2017

Recommended by Chair, Graduate Council Committee on Programs and Courses:

On Behalf of M. Kathleen Heid
Printed name
Signature
Date: 01/23/2017

Noted by Dean of the Graduate School:

On Behalf of Regina Vasilatos-Younken
Printed name
Signature
Date: 01/23/2017
JUSTIFICATION

The School of International Affairs is proposing to change the course numbers of two of its core courses. The School is proposing to change INTAF 805 (International Economics: Principles, Policies, and Practices) to INTAF 506 (International Economics: Principles, Policies, and Practices) and to add INTAF 890 (Colloquium) to the core curriculum while removing INTAF 590 (Colloquium). These two changes will more appropriately capture the content of these classes.

We propose to change the designation of INTAF 805 to INTAF 506. Changing the course number of INTAF 805 to INTAF 506 will better reflect the research-based content and analytical style of this demanding graduate course. Since 500-level courses tend to focus on theory and research, INTAF 506 is a more suitable course number for International Economics: Principles, Policies, and Practices. INTAF 506 (International Economics: Principles, Policies, and Practices) is a highly analytical course that incorporates high-level research readings that focus on theory and abstract conceptualization. This class requires students on both their take home exams and assignments to produce graduate level research. The class would clearly be appropriate for Ph.D. students looking to develop knowledge of international trade and economic policy. The course focuses on two issues with two primary objectives. The first is to understand and explain patterns of trade existing between economies and nations. The second is to understand how an economy is influenced by global economic trends and events, particularly (though not exclusively) in terms of understanding how best to optimally structure policy interventions. This first set of topics relate to trade theory while the second, to what is termed, is either international finance or open economy macroeconomics. The objectives and course content are primarily focused on theory and research within the field while also showing students how to conduct economic analyses.

We propose to change the designation of INTAF 590 to INTAF 890. Updating the colloquium course number to INTAF 890 would also better reflect the content of this professional-focused core course. This course surveys current, critical, transnational policy problems, policies and policy procedures. Policy issues that may be covered in the course are suggested by the Copenhagen Consensus, and include: climate change; communicable diseases; conflict and arms proliferation; access to education; financial instability; governance and corruption; malnutrition and hunger; migration; sanitation and access to clean water; and subsidies and trade barriers. The course involves team teaching and guest lecturers, while requiring students to apply their knowledge to real world examples presented to them in the course. The guest speakers are generally top policy makers from the US and abroad who are experts in the week’s critical topic area. Students prepare policy briefs and a policy paper. The course has a strong professionalization element – each student spends time in a small group (usually lunch) with at least one of the speakers and a number of critical professionalization topics are addressed in the course. The class puts a premium on both learning how to develop better policy and acquiring improved professional skills – making it more suited to a 800 level designation. The course is not a Ph.D. style research seminar, but rather a policy colloquium suitable for students interested in learning about the range of policy topics currently facing many international affairs policy makers, meeting a sub set of these policy makers, and learning directly from them how they respond to these policy issues.
# COMPARISON OF CHANGES

<table>
<thead>
<tr>
<th></th>
<th>Existing Requirements</th>
<th>New Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.I.A. Degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Courses (18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTAF801(3), INTAF802(3), INTAF803(3), INTAF804(3), INTAF805(3), INTAF590(3)</td>
<td>INTAF801(3), INTAF802(3), INTAF803(3), INTAF804(3), INTAF890(3), INTAF506(3)</td>
<td></td>
</tr>
<tr>
<td>Electives (21)</td>
<td>Course choices are from a pre-approved list in the SIA, or by SIA faculty-approved substitution.</td>
<td>Electives (21)</td>
</tr>
<tr>
<td>Capstone (3)</td>
<td></td>
<td>Capstone (3)</td>
</tr>
<tr>
<td>Master’s Paper (INTAF594) or Internship (INTAF595)</td>
<td>Master’s Paper (INTAF594) or Internship (INTAF595)</td>
<td></td>
</tr>
<tr>
<td>Total Degree Credits (42)</td>
<td></td>
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</tr>
</tbody>
</table>
International Affairs (INTAF)

Program Home Page

SCOTT GARTNER, Director, School of International Affairs
245 Lewis Katz Building
814-867-2789

Degrees Conferred:

M.I.A.

Integrated B.A. in Asian Studies, Chinese, or Japanese/M.I.A. in International Affairs
Integrated B.A. in German/M.I.A. in International Affairs
Integrated B.S. in German/M.I.A. in International Affairs
Integrated B.A. in International Politics/M.I.A. in International Affairs
Integrated B.A. in Political Science/M.I.A. in International Affairs
Integrated B.A. in Russian/M.I.A. in International Affairs

The Graduate Faculty

The Program

The School of International Affairs (SIA) is designed to prepare students for occupations involving public service, private enterprise, nonprofit organizations, and international organizations worldwide. The Master of in International Affairs (MIA) degree program will provide students with a substantial knowledge base in international systems, institutions, issues and history and the advanced analytical tools and cross-cultural skills and competencies necessary for these occupations. Students will work closely with faculty to design a curriculum around their core course work, which incorporates a functional or regional theme and provides the opportunity to apply and enhance the core knowledge component with a thematically based set of graduate courses from across Penn State’s existing graduate and professional curriculum.

Admission Requirements

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

All applicants will submit GRE scores, two letters of recommendation, and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.

International applicants are required to submit English proficiency test scores, unless they are from one of the countries listed as exempt in the Graduate Bulletin. English proficiency test scores must meet or exceed the minimum acceptable scores listed in the Bulletin. Applicants with a score of 19 or higher on the speaking section of the TOEFL Internet-based test will be considered for admission, though a score of 23 or higher is desirable.
Admissions will be based on a review of all submitted materials and spaces will be offered to the best qualified applicants, taking into account academic achievement, relevant work experience and other indices of aptitude for advanced study in international affairs.

Master's Degree Requirements

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

The program requires six courses which are designed to establish a base of knowledge in key subject areas which reflect the basic mission of the SIA. These courses will form the core curriculum for the M.I.A. This core curriculum is designed to provide students with a strong foundation in the ethical dimensions of international exchange, with skills essential to perform quantitative and qualitative analysis in cross-cultural contexts and with leadership training designed to understand and bridge the cultural differences. A minimum of 42 credits at the 400, 500, or 800 level will be required for completion of the program, at least 18 of which must be from courses at the 500 and 800 level. A minimum of 6 credits must be at the 500 level. Students are required to take 18 credits of core courses in: INTAF 506 (3), INTAF 801 (3), INTAF 802 (3), INTAF 803 (3), INTAF 804 (3), and INTAF 890 (3).

In addition to completing the core curriculum, students will choose their remaining courses, with faculty guidance, from a substantial list of elective courses for a total of 21 credits. A list of approved elective courses is maintained by the graduate program office. The courses usually will be clustered around areas of concentration designated by the SIA faculty, but students also will be permitted to design an independent interdisciplinary curriculum with faculty approval. The areas of concentration, which will be pre-approved by the faculty, will take advantage of Penn State's rich graduate curriculum by aggregating in appropriate thematic clusters pre-existing and specially-created graduate-level classes.

In addition to the core curriculum and elective courses, degree candidates must complete either: (i) a master's paper; or (ii) a supervised internship placement. If the first option is chosen and the candidate opts to complete a paper, they must enroll in 3 credits of INTAF 594. The master's paper will involve integrating and showing mastery of the subject matter of the student's curricular emphasis, and may also involve original research. If the second option is chosen, the candidate will enroll in 3 credits of INTAF 595. The student will participate in a supervised internship placement of sufficient depth and professionalism that would allow the student to experience the integration of their curricular studies in an actual professional environment. A reflective paper will be submitted as a part of this credit requirement.

In order to graduate, students also will need to demonstrate proficiency in a language other than English. Proficiency will be defined as follows: (i) four semesters of a Penn State language sequence or its equivalent (15 credits with a quality grade of C or better using a 4.0 scale); (ii) native acquisition, as shown by the candidate's personal history and approved by the SIA faculty; or (iii) performance on a proficiency evaluation sufficient to equal four semesters of language learning: for this purpose, either Penn State's proficiency certification process (described below) or another pre-approved proficiency assessment may be used.

Joint Degree Program between Penn State Law (J.D.) and the School of International Affairs (M.I.A.)

Joint Degree Program:

Penn State Law and the School of International Affairs are offering a joint degree program that will enable a student to complete in four academic years both a Juris Doctor degree (J.D.) and a Master of International Affairs (M.I.A.). A J.D./M.I.A. graduate will have the education and skills background to practice law in the United States, to work in an international context and to assume a leadership role in international affairs.
Admission Requirements

Students must apply to and meet the admission requirements of both the graduate program in which they intend to receive their graduate degree and the professional degree program. The admission requirements for the Master of International Affairs degree are listed above. Admissions requirements and applications for admission for Penn State Law are available at the J.D. Admissions section of the Penn State Law website.

Students applying to the joint degree program must be admitted separately into both Penn State Law and the School of International Affairs. Students must first be admitted into the law school and will always complete their first two semesters in law before commencing the M.I.A. component. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree.

Residency

A typical J.D./M.I.A. joint degree student will be in residence at Penn State Law for six semesters and at the School of International Affairs for two semesters.

Liaisons

The respective liaisons for Penn State Law and the School of International Affairs shall be as follows: the department and faculty liaisons for Penn State Law shall be the Associate Dean for Academic Affairs and the student adviser will be the Associate Dean for Academic Affairs or such other faculty member(s) as may be designated by the Dean. The liaison for the School of International Affairs shall be the Director or such faculty member(s) as may be designated by the Director.

Double-Counting of Credits

Penn State Law: A maximum of twelve credits of M.I.A. course work may be double-counted for credit toward the J.D. degree at Penn State Law. Courses eligible for double-counting towards the J.D. and M.I.A. include the courses on the M.I.A. Electives list and any other courses taken as M.I.A. electives with the express written permission of the M.I.A. and J.D. advisers. Students must obtain a grade satisfactory to Penn State Law for the course work to be credited towards the J.D. degree.

School of International Affairs: A maximum of twelve credits of law school course work may be double-counted for credit toward the M.I.A. degree. Courses eligible for double-counting towards the J.D. and M.I.A. include the courses on the M.I.A. Electives list and any other courses taken as M.I.A. electives with the express written permission of the M.I.A. and J.D. advisers.

Sequence

Joint Degree students will complete the first two semesters of the M.I.A. consecutively during the second year immediately following completion of the first year of the J.D. degree. The third and fourth year of the joint program will be in residence with Penn State Law and will include both required law classes and remaining electives to fulfill the M.I.A.

Recommended Program of Study and Advising

All students in the program will have two advisers, one from Penn State Law and one from the School of International Affairs. Periodic interaction between the two advisers is encouraged. A program of study will be developed for each student, taking into account the fact that some courses at both locations are offered on a rotating or intermittent basis. Many courses are offered every year but some are offered every two or three years. Advisers will have available a list of projected relevant courses or educational experiences in order to
work with the student on an individualized program of study. The standard committee structure will apply to the School of International Affairs programs.

**Tuition**

Students will be charged the applicable Penn State Law tuition to cover the J.D. program and the applicable School of International Affairs tuition to cover the M.I.A. degree program. The Penn State Law tuition will be paid for the semesters that the student is in residence at Penn State Law, and the the School of International Affairs tuition will be paid for the semesters that the student is in residence there. A student may take up to one course (3 credit hours) per semester in the school where the student is not in residence without any change in tuition, but must pay additional tuition to the non-residential program if he or she wishes to take additional course work in that program during that semester.

**Financial Aid and Assistantships**

Decisions on financial aid and assistantships are made by each school according to that school's procedures. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.

**Fulfillment of Degree Requirements and Graduation**

A student in the program may complete the requirements for one of the degrees and be awarded that degree prior to completing all the requirements for the other degree; provided, however, that the student shall have successfully completed at least two semesters of work towards the other degree. All courses in one program that will count towards meeting the requirements of the other must be completed before the awarding of either degree. Students will be required to fulfill all requirements for each degree in order to be awarded that degree, subject to the inter-program transfer of credits. If students accepted into the joint degree program are unable to complete the J.D. degree, they are still eligible to receive the M.I.A. degree if all the M.I.A. degree requirements have been satisfied.

Important Note: If the joint degree student is using law (900-level) credits toward the graduate degree during their last semester of enrollment, they should be prepared to extend their graduate degree graduation to a subsequent semester (the following semester at a minimum). This is due to the graduate degree approval deadline falling before the law (900-level) course grading processes are complete.

**Integrated Undergraduate-Graduate (IUG) Degree Program B.A. in Asian Studies, Chinese, or Japanese and Master of International Affairs (M.I.A.)**

The integrated undergraduate-graduate (IUG) degree program (B.A. in Asian Studies, Chinese, or Japanese/M.I.A. in International Affairs) provides an opportunity for strong students in these majors to complete a master’s degree with 5 total years of study.

An increasingly globalized economy is likely to escalate the demand for graduate training in international affairs. The career choices for graduates with this training will also expand sharply.

The integrated degree program prepares students for a variety of careers requiring an interdisciplinary background in Asian Studies or Asian languages and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational
corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations. The School of International Affairs (SIA) Master of International Affairs (M.I.A.) represents a professional degree designed to prepare students to thrive in these increasingly global career paths.

**Admission Requirements**

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

The number of openings in the integrated B.A./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree. Specific requirements:

1. Must be enrolled in the Asian Studies, Chinese, or Japanese B.A. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation, and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
5. Must provide written endorsement from the head of Asian Studies.

**M.I.A. Requirements for the Integrated B.A./M.I.A.**

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Arts in Asian Studies, Chinese, and Japanese are listed on the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master’s Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Courses that may be double-counted include: ASIA 463, ASIA 465Y, ASIA 469, ASIA 475Y, ASIA 476, ASIA 481, ASIA 486, ASIA 489, ASIA 493, ASIA 501, ASIA 502, and ASIA 577. The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

**Tuition Charges, Grant-in-Aid, and Assistantships**

Students admitted to the School of International Affairs through the IUG with a B.A. in Asian Studies, Chinese, or Japanese may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.
Integrated Undergraduate/Graduate (IUG) Degree Program B.A. in German and Master of International Affairs (M.I.A.)

The integrated undergraduate-graduate (IUG) degree program (B.A. in German/M.I.A. in International Affairs) provides an opportunity for strong students in these majors to complete a master’s degree with 5 total years of study.

An increasingly globalized economy is likely to escalate the demand for graduate training in international affairs. The career choices for graduates with this training will also expand sharply. The integrated degree program prepares students for a variety of careers requiring an interdisciplinary background in German and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations. The School of International Affairs (SIA) Master of International Affairs (M.I.A.) represents a professional degree designed to prepare students to thrive in these increasingly global career paths.

Admission Requirements

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

The number of openings in the integrated B.A./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree. Specific requirements:

1. Must be enrolled in the German B.A. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation, and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
5. Must provide written endorsement from the head of Germanic and Slavic Languages and Literatures.

M.I.A. Requirements for the Integrated B.A./M.I.A.

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Arts in German are listed in the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master’s Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.
Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. The list of courses that can double count includes GER 408, GER 431, GER 432, GER 489, GER 494, GER 540, GER 581, and GER 592. The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

**Tuition Charges, Grant-in-Aid, and Assistantships**

Students admitted to the School of International Affairs through the IUG with a B.A. in German may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the *Graduate Bulletin*.

### Integrated Undergraduate-Graduate (IUG) Degree Program B.S. in German and Master of International Affairs (M.I.A.)

The integrated undergraduate-graduate (IUG) degree program (B.S. in German/M.I.A. in International Affairs) provides an opportunity for strong students in these majors to complete a master's degree with 5 total years of study.

An increasingly globalized economy is likely to escalate the demand for graduate training in international affairs. The career choices for graduates with this training will also expand sharply. The integrated degree program prepares students for a variety of careers requiring an interdisciplinary background in German and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations. The School of International Affairs (SIA) Master of International Affairs (M.I.A.) represents a professional degree designed to prepare students to thrive in these increasingly global career paths.

**Admission Requirements**

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

The number of openings in the integrated B.S./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree. Specific requirements:

1. Must be enrolled in the German B.S. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation, and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
5. Must provide written endorsement from the head of Germanic and Slavic Languages and Literatures.
M.I.A. Requirements for the Integrated B.S./M.I.A.

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in German are listed in the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master’s Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. The list of courses that can double count includes GER 408, GER 431, GER 432, GER 489, GER 494, GER 540, GER 581, and GER 592. The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

Tuition Charges, Grant-in-Aid, and Assistantships

Students admitted to the School of International Affairs through the IUG with a B.S. in German may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.

Integrated Undergraduate/Graduate (IUG) Degree Program B.A. in International Politics and Masters in International Affairs (M.I.A.)

The integrated undergraduate-graduate (IUG) degree program (B.A. in International Politics/M.I.A. in International Affairs) will provide an opportunity for strong students in International Politics to complete a master's degree with 5 total years of study.

The demand for graduate training in international affairs will grow significantly in the near future along with the burgeoning requirements for international knowledge and professional experience in commerce, humanitarian service, and public affairs. The career choices for graduates with this training will also expand sharply. The integrated degree program would prepare students for a variety of careers requiring an interdisciplinary background in politics and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations.

The IUG degree in International Affairs and International Politics is both timely and consistent with the tradition of interdisciplinary studies at other schools of international affairs. It will also strengthen the School of International Affairs’ existing collaborations and interactions with the College of the Liberal Arts.

Admission Requirements

The number of openings in the integrated B.A./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree.
Specific requirements:

1. Must be enrolled in the International Politics B.A. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade-point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser as the student advances through the program.
5. Must provide written endorsement from the head of the undergraduate program/department.

M.I.A. Requirements for the Integrated B.A./M.I.A.
Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Arts in International Politics are listed in the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master's Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 9 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. The following 9 credits may be double-counted toward the B.A. and the M.I.A.: PL SC 415 (3), PL SC 550 (3), PL SC 554 (3). The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

Tuition Charges, Grant-in-Aid and Assistantships

Students admitted to the School of International Affairs through the IUG with International Politics may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.

Integrated Undergraduate/Graduate (IUG) Degree Program B.A. in Political Science and Masters in International Affairs (M.I.A.)

The integrated undergraduate-graduate (IUG) degree program (B.A. in Political Science/M.I.A. in International Affairs) will provide an opportunity for strong students in Political Science to complete a master’s degree with 5 total years of study.

An increasingly globalized economy is likely to escalate the demand for graduate training in international affairs. The career choices for graduates with this training will also expand sharply. The integrated degree program would prepare students for a variety of careers requiring an interdisciplinary background in politics and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations. The School of International Affairs (SIA) Master of International Affairs (M.I.A.) represents a professional degree designed to prepare students to thrive in these increasingly global career paths.
The IUG degree in International Affairs and Political Science is both timely and consistent with the tradition of interdisciplinary studies at other schools of international affairs. It will also strengthen the School of International Affairs’ existing collaborations and interactions with the College of the Liberal Arts.

Admission Requirements

The number of openings in the integrated B.A./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree. Specific requirements:

1. Must be enrolled in the Political Science B.A. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade-point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser as the student advances through the program.
5. Must provide written endorsement from the head of Political Science.

M.I.A. Requirements for the Integrated B.A./M.I.A.

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Arts in Political Science are listed in the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master's Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 9 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. The following 9 credits may be double-counted toward the B.A. and the M.I.A.: PL SC 415 (3), PL SC 550 (3), PL SC 554 (3). The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

Tuition Charges, Grant-in-Aid and Assistantships

Students admitted to the School of International Affairs through the IUG with Political Science may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.

Integrated Undergraduate-Graduate (IUG) Degree Program B.A. in Russian and Master of International Affairs (M.I.A.)
The integrated undergraduate-graduate (IUG) degree program (B.A. in Russian/M.I.A. in International Affairs) provides an opportunity for strong students in these majors to complete a master's degree with 5 total years of study.

An increasingly globalized economy is likely to escalate the demand for graduate training in international affairs. The career choices for graduates with this training will also expand sharply. The integrated degree program prepares students for a variety of careers requiring an interdisciplinary background in Russian and international affairs. Examples of types of entities hiring in these areas are federal, state, and local governments, international organizations, multinational corporations, international banking and financial institutions, media organizations and journalism, consulting firms, policy research centers, and development assistance programs and foundations. The School of International Affairs (SIA) Master of International Affairs (M.I.A.) represents a professional degree designed to prepare students to thrive in these increasingly global career paths.

Admission Requirements

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

The number of openings in the integrated B.A./M.I.A. program is limited. Admission will be selective based on specific criteria set by the School of International Affairs. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study. Students must be admitted to the program prior to taking the first course they intend to count towards the graduate degree. Specific requirements:

1. Must be enrolled in the Russian B.A. program.
2. Must apply to and be accepted into The Graduate School and the M.I.A. program in the School of International Affairs. Students must complete the Graduate School application. All applicants will submit GRE scores, two letters of recommendation, and a personal statement addressing their reasons for pursuing a graduate degree in international affairs and discussing their plans and goals.
3. Although the program has no fixed minimum grade point average, an applicant is generally expected to have a minimum overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
4. Must include a plan of study identifying undergraduate credits to be applied to the M.I.A. degree elective requirements. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
5. Must provide written endorsement from the head of Germanic and Slavic Languages and Literatures.

M.I.A. Requirements for the Integrated B.A./M.I.A.

Students must fulfill all requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Arts in Russian are listed in the Undergraduate Degree Programs Bulletin. Degree requirements for the M.I.A. degree are listed in the Master's Degree Requirements section above. If students accepted into the IUG program are unable to complete the M.I.A. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

The list of courses that can double count includes RUS 400, RUS 405, RUS 406, RUS 412, RUS 494, RUS 501, and RUS 525. Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. The graduate thesis or other graduate culminating/capstone experience (including any associated credits and/or deliverables) may not be double counted towards any other degree.

Tuition Charges, Grant-in-Aid, and Assistantships
Students admitted to the School of International Affairs through the IUG with Russian may be considered to receive financial assistance. Students on graduate assistantships must adhere to the course load limits set forth in the Graduate Bulletin.

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.

INTERNATIONAL AFFAIRS (INTAF) course list

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