ACADEMIC AFFAIRS, STUDENT AFFAIRS, & PLANNING COMMITTEE
AGENDA

Friday, June 14, 2013 – 9:30a.m.

Sellers Auditorium, Bryant Conference Center
Tuscaloosa

Committee Members
The Honorable Karen P. Brooks
The Honorable John H. England, Jr. – Chair
The Honorable Joseph C. Espy III
The Honorable Ronald W. Gray – Vice-Chair
The Honorable Andria Scott Hurst
The Honorable Finis E. St. John IV
The Honorable Marietta M. Urquhart
The Honorable Kenneth L. Vandervoort
The Honorable James W. Wilson III

Roll Call
Michael Bownes, Secretary of the Board, will call the Committee roll.

Introduction of Press
Kellee Reinhart will introduce members of the media in attendance.

Approval of Minutes of the April 12, 2013 Committee Meeting
Minutes of the Friday, April 12, 2013 meeting have been mailed to Committee members for review. No changes have been recommended. A motion for approval will be entertained.
Academic Affairs, Student Affairs, and Planning Committee Report

Individual Action Items

1. Consideration of Resolution granting Initial Approval of and Permission to Submit to the Alabama Commission on Higher Education (ACHE) a Notification of Intent to Submit a Proposal (NISP) for a Bachelor of Science Degree (B.S.) in Architectural Engineering (C.I.P. Code 14.0401) at UA

2. Consideration of Resolution granting Initial Approval of and Permission to Submit to the Alabama Commission on Higher Education (ACHE) a Notification of Intent to Submit a Proposal (NISP) for a Bachelor of Science Degree (B.S.) in Environmental Engineering (C.I.P. Code 14.1401) at UA

3. Consideration of Resolution approving Establishment of the Department of Neurosurgery in The University of Alabama School of Medicine at UAB

4. Administrative Action Items

a. Consideration of Resolution granting Approval of a Post-Master's Certificate Program in Women's Studies in The Department of Gender and Race Studies at UA

b. Consideration of Resolution approving appointment of Joseph E. Phelps, Ph.D., to the Reese Phifer Endowed Professorship in the Department of Advertising and Public Relations in the College of Communication and Information Sciences at UA

c. Consideration of Resolution approving appointment of Elizabeth Aversa, Ph.D., as Professor Emerita of the School of Library and Information Studies in the College of Communication and Information Sciences at UA

d. Consideration of Resolution approving appointment of Bruce K. Berger, Ph.D., as Professor Emeritus of the Department of Advertising and Public Relations in the
THE UNIVERSITY OF ALABAMA

Resolution

NISP to Develop a New Bachelor of Science Degree in Architectural Engineering
(CIP 14.0401)

WHEREAS, there is significant job growth in the building design and construction industry in the state, region, and nationally; and

WHEREAS, there are only 17 accredited Architectural Engineering degree programs in the U.S. and none in the State of Alabama; and

WHEREAS, there is high student demand for engineering-based building design programs in the state and region; and

WHEREAS, a new degree program in Architecture Engineering will benefit the building design and construction-related industries in the state and region; and

WHEREAS, Architectural Engineering is an integration of building design, construction, and operations; and

WHEREAS, all areas that define Architectural Engineering are currently taught within existing programs at The University of Alabama, specifically including Civil Engineering, Construction Engineering, and Mechanical Engineering; and

WHEREAS, the new degree program is an outgrowth of The University of Alabama's existing and highly popular minor in Architectural Engineering offered by the Department of Civil, Construction and Environmental Engineering;

NOW, THEREFORE, BE IT RESOLVED by The Board of Trustees of The University of Alabama that it supports the development of a proposal for a Bachelor of Science degree in Architectural Engineering at The University of Alabama.

BE IT FURTHER RESOLVED that it approves the submission of the Notice of Intent to Submit a Proposal (NISP) to the Alabama Commission on Higher Education for a new program leading to the Bachelor of Science degree in Architectural Engineering at The University of Alabama.
Chancellor: Robert Witt
The University of Alabama System
401 Queen City Avenue
Tuscaloosa, Alabama 35401

Dear Chancellor Witt:

The College of Engineering wishes to plan two new baccalaureate degree programs in Environmental Engineering and Architectural Engineering. Dr. Kenneth J. Fridley and the faculty in the Department of Civil and Environmental Engineering have prepared the Notification of Intent to Submit a Proposal (NISP) as required by our Board of Trustees and the Alabama Commission on Higher Education. This proposal has the strong support of Dean Chuck Karr and Interim Provost Joe Benson. I am pleased to add my support for this initiative as I believe these academic programs are needed.

It is my understanding that subject to your review and approval, the NISP must be approved by the Board of Trustees prior to submission to the Alabama Commission on Higher Education. Interim Provost Benson will be pleased to provide any additional information that you may need about the University's plans for these new programs.

Sincerely,

Judy Bonner
President

Enclosure

cc: Interim Provost Joe Benson
    Dean Chuck Karr
    Dr. Kenneth J. Fridley
MEMORANDUM

TO: Judy Bonnen, Provost
FROM: Charles L. Kari, Dean

SUBJECT: Proposed New Baccalaureate Degree Programs in Environmental Engineering and Architectural Engineering.

The Civil, Construction, and Environmental Engineering faculty propose to establish two new degree programs. Both proposed programs are outgrowths of minors currently offered in the department. I have attached four documents to this memorandum that provide detailed information on the two proposed programs:

1. a Notice of Intent to Submit a Proposal for a New Program of Instruction for the architectural engineering program,
2. a Notice of Intent to Submit a Proposal for a New Program of Instruction for the environmental engineering program,
3. a draft curricula for both programs, and
4. a listing of other accredited programs nationally with the accreditation criteria for both programs.

Each of these programs can be offered without the addition of new faculty. Further, we can offer an accredited degree program in architectural engineering without any additional course offerings. An accredited degree program in environmental engineering will require the addition of one new laboratory course -- an effort that is currently underway to strengthen the existing minor in Environmental Engineering and Water Resources Engineering.

The faculty in the Department of Civil, Construction, and Environmental Engineering feel that the department is both qualified and adequately staffed to offer each of these new programs. Furthermore, they feel that by offering these programs they can continue to differentiate their department from other more traditional and single-dimensioned civil engineering programs in the state and the region. Finally, based on national enrollment data, these programs should substantially improve their ability to recruit the best and brightest students locally, regionally, and nationally; all with increased diversity since nationally these two programs have the highest percentage of women in engineering.

I support the two proposed programs. In particular, I feel that both programs would enhance our ability to recruit outstanding female students. Women in Science and Engineering reports that based on percentages, architectural engineering is the number one "mechanics" focused engineering program for females; and environmental engineering is the number one "chemistry" focused program for females. Further, offering a BS in Architectural Engineering would allow us to attract high-end students who have an interest in architecture. I feel these programs support the goals, vision, and mission of The University and will serve well the interests of the State of Alabama.
NOTE: Notification of Intent to Submit a Proposal (NISP) for a new program in Architectural Engineering

Alabama Commission on Higher Education

NOTIFICATION OF INTENT TO SUBMIT A PROPOSAL (NISP) FOR A NEW PROGRAM OF INSTRUCTION

1. Institution: The University of Alabama

2. Date of NISP Submission: October 18, 2012

3. Institutional Contact Person: Kenneth J. Fridley
   Head, Civil, Construction & Environmental Engineering
   205-348-3585
   205-348-0783
   kfridley@eng.ua.edu

4. Program Identification:
   Title: Architectural Engineering
   Award: Bachelor of Science
   CIP Code: 14.04.01

5. Proposed Program Implementation Date: August 16, 2014
   It should be noted, however, that the freshman and sophomore years of the proposed program will be effectively the same as those of the civil engineering (CE) and construction engineering (ConE) programs, and very similar to that of other engineering programs as well. Therefore, students who start their academic studies prior to August 2014 may easily transfer into the proposed architectural engineering (ArChE) program.

6. Statement of Program Objectives (Objectives should be precise and stated in such a way that later evaluation/assessment of program outcomes is facilitated):
   Graduates of the program will be able to apply mathematics through differential equations, calculus-based physics, and chemistry. The four basic architectural engineering curriculum areas are building structures, building mechanical systems, building electrical systems, and construction/construction management. Graduates will be expected to reach the synthesis (design) level in one of these areas, the application level in a second area, and the comprehension level in the remaining two areas. Graduates will also be able to discuss the basic concepts of architecture in a context of architectural design and history.

   The above program objectives are based on current ABET/EAC program criteria for architectural engineering.
7. Relationship of program to other programs within the institution.

a. How will the program support or be supported by other programs within the institution?

Architectural engineering is a relatively new yet established field within engineering, but it is also one that is traditionally supported educationally through other degree programs such as civil engineering. The proposed program will draw heavily from current course offerings in civil engineering, mechanical engineering and electrical engineering.

b. Will this program replace any existing program(s) or specialization(s), options, or concentrations within existing programs? Yes: __ No: X

If yes, please explain. It should be noted, however, that this program is an outgrowth of the University's successful minor in architectural engineering offered within the civil engineering program. It is expected that the minor will remain in effect and even be enhanced for civil engineering and other majors interested in architectural engineering, and the proposed architectural engineering program will be directed towards engineering students whose focus and career choice is in design of building systems.

8. If this program is duplicative of any other program(s) in the state, please give your rationale for program duplication.

This program is not duplicative of any other program in the state. There are architecture programs, but no architectural engineering programs exist. Architectural engineering, while related to architecture, is a significantly different academic program of study. To illustrate this point, the American Society of Civil Engineers hosts the Architectural Engineering Institute and is the lead society in defining the accreditation criteria for architectural engineering. The focus of architectural engineering is on the design, construction and maintenance of the building support systems, including the structural systems, the heating and ventilation systems, and electrical systems. According to the US Department of Education, architectural engineering is an "instructional program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of materials, systems, and methods used to construct and equip buildings intended for human habitation or other purposes."

In contrast, architecture is defined as an "instructional program that prepares individuals for the independent professional practice of architecture (including) instruction in architectural design; architectural history and theory; building structures and environmental systems; site planning; construction; professional responsibilities and standards; and the cultural, social, economic and...
environmental issues relating to architectural practice." To further differentiate the proposed program from architecture, graduates will be eligible to seek licensure as a professional engineer (PE).

9. Do you plan to explore possible program collaboration with other institutions? Please explain.

Initially, no formal collaborations are proposed. As the program develops, collaborations with other institutions may result. Most likely, these collaborations will be initiated within the UA System in the form of shared courses via ITS (see below).

A significant issue facing collaborative programs is the accreditation process. The sharing of courses, making specific expertise faculty and program content available to students at other institutions, as well as drawing on other institutional expertise will be promoted with this program. However, accreditation issues suggest that the major courses, at least initially, would be best served being administered by one institution. The program as proposed will be accredited as an engineering degree program under the requirements set forth by the ABET Engineering Accreditation Council (ABET/TEAC) and will be synchronized with and supported by the accreditation of the other engineering programs at UA, both in terms of the timing of reports and visitations as well as the institutional approach to outcomes and assessment.

10. Do you anticipate the use of distance education technology in the delivery of the program? Please explain.

Initially, no use of distance education technology is planned. It may be considered as the program develops.

11. What methodology will you use to determine the level of student demand for this program?

Currently, there are 17 ABET/TEAC-accredited architectural engineering programs in the US, including two in the Southeast (Tennessee State University and the University of Miami). To determine student demand, a review of historic enrollment data available through the American Society for Engineering Education (ASEE), will be conducted. In addition to enrollment data, a review of student demographics will be included to assess potential positive impacts on diversity. An informal survey of civil engineering programs in the US indicated architectural engineering is fastest growing program within civil-related disciplines.

12. What methodology will you use to determine need for this program?

Projections by the U.S. Department of Labor indicates the employment demand for
structural, construction and architectural engineers will continue to grow at a rate exceeding that for all technical professions through 2020. The demand for architectural engineers locally, regionally, and nationally will continue to increase. Additional data and reports from the Department of Labor will be evaluated and reported as part of the final proposal.

In addition, a survey of the state's and region's primary architectural and engineering employers, including both the public and private sectors will be conducted to validate the need for this program.

Certification

[Signature]
Chief Academic Officer

Graduate Dean (if this is a graduate program)

5/30/13
Date
DRAFT BSArchE and BSEnvE Curricula
Approved by the Civil, Construction and Environmental Engineering Faculty
August 21, 2012

ABET PROGRAM CRITERIA FOR ARCHITECTURAL ENGINEERING

The program must demonstrate that graduates can apply mathematics through differential equations, calculus-based physics, and chemistry. The four basic architectural engineering curriculum areas are building structures, building mechanical systems, building electrical systems, and construction/construction management. Graduates are expected to reach the synthesis (design) level in one of these areas, the application level in a second area, and the comprehension level in the remaining two areas. The engineering topics required by the general criteria shall support the engineering fundamentals of each of these four areas at the specified level. Graduates are expected to discuss the basic concepts of architecture in a context of architectural design and history.

The design level must be in a context that:
1. considers the systems or processes from other architectural engineering curricular areas;
2. works within the overall architectural design;
3. includes communication and collaboration with other design or construction team members;
4. includes computer-based technology and considers applicable codes and standards; and
5. considers fundamental attributes of building performance and sustainability.

DRAFT ARCHITECTURAL ENGINEERING CURRICULUM

FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 121 Intro to Civil, Construction &amp; Environmental Engng</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 111 Engineering the Future</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 131 Engineering Concepts and Design I</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 151 Fundamentals of Engineering Graphics</td>
<td>1</td>
</tr>
<tr>
<td>MATH 125 Calculus I (MA)</td>
<td>4</td>
</tr>
<tr>
<td>CHE 101 General Chemistry I (N)</td>
<td>4</td>
</tr>
<tr>
<td>EN 103 English Composition I (FC)</td>
<td>3</td>
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<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>ENGR 141 Engineering Concepts and Design II</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 171 Large-Scale Engineering Graphics</td>
<td>1</td>
</tr>
<tr>
<td>MATH 126 Calculus II (MA)</td>
<td>4</td>
</tr>
<tr>
<td>PH 105 General Physics with Calculus I (N)</td>
<td>4</td>
</tr>
<tr>
<td>EN 102 English Composition II (FC)</td>
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<tr>
<td>History (HI) or social and behavioral sciences (SB) elective</td>
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Total: 15

Changes to be made as needed if new courses added.

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**ALTERNATE FRESHMAN YEAR W/ ART 131**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGR 111 Engineering the Future</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 131 Engineering Concepts and Design I</td>
<td>1</td>
</tr>
<tr>
<td>ART 131 Design II (Section for Engineering Students)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 126 Calculus I (MA)</td>
<td>4</td>
</tr>
<tr>
<td>CHE 101 General Chemistry I (N)</td>
<td>4</td>
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<tr>
<td>EN 101 English Composition I (FC)</td>
<td>3</td>
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<table>
<thead>
<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>GE 121 Intro to Civil, Construction &amp; Environmental Engr.</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 141 Engineering Concepts and Design II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 126 Calculus II (MA)</td>
<td>4</td>
</tr>
<tr>
<td>PH 105 General Physics with Calculus I (N)</td>
<td>4</td>
</tr>
<tr>
<td>EN 102 English Composition II (FC)</td>
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<tr>
<td>History (HI) or social and behavioral sciences (SB) elective</td>
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| Change title as needed (if new degree is added). |

**SOPHOMORE YEAR:**

<table>
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<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>CE 262 Civil and Construction Engineering Surveying</td>
<td>2</td>
</tr>
<tr>
<td>AEM 201 Statics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 227 Calculus III (MA)</td>
<td>4</td>
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<tr>
<td>PH 106 General Physics with Calculus II (N)</td>
<td>4</td>
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<tr>
<td>Humanities (HU), Literature (L), or fine arts (FA) elective</td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>CE 262 Civil and Construction Engineering Materials</td>
<td>3</td>
</tr>
<tr>
<td>AEM 250 Mechanics of Materials I</td>
<td>3</td>
</tr>
<tr>
<td>AEM 264 Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 228 Applied Differential Equations I (MA)</td>
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</tr>
<tr>
<td>Approved natural science (N) elective</td>
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| Change title as needed (if new degree is added). |

**JUNIOR YEAR**

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<th>First Semester</th>
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<tbody>
<tr>
<td>GE 331 Introduction to Structural Engineering (C)</td>
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<tr>
<td>GE 340 Geotechnical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>GE 365 Introduction to Construction/Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECE 320 Fundamentals of Electrical Engineering</td>
<td>3</td>
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<tr>
<td>History (HI) or social and behavioral sciences (SB) elective</td>
<td>3</td>
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<td><strong>16</strong></td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>GE 434 Structural Steel Design I</td>
<td>3</td>
</tr>
<tr>
<td>GE 462 Vertical Construction Methods</td>
<td>3</td>
</tr>
<tr>
<td>ECE 350 Electrical Power and Machines</td>
<td>3</td>
</tr>
<tr>
<td>ME 216 Thermal Engineering Survey</td>
<td>3</td>
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<tr>
<td>History (HI) or social and behavioral sciences (SB) elective</td>
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</tbody>
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**SENIOR YEAR**

**First Semester**
- Senior (plan of study) elective \(^3\)  
- CE 433 Reinforced Concrete Structures 1  
- ME 407 Heating, Ventilating, and Air Conditioning  
- COM 123 Public Speaking (HU) \(^2\)  
- GES 256 Engineering Statistics 1

<table>
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<th>Course Description</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Senior (plan of study) elective (^3)</td>
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<tr>
<td>CE 433 Reinforced Concrete Structures 1</td>
<td>3</td>
</tr>
<tr>
<td>ME 407 Heating, Ventilating, and Air Conditioning</td>
<td>3</td>
</tr>
<tr>
<td>COM 123 Public Speaking (HU) (^2)</td>
<td>3</td>
</tr>
<tr>
<td>GES 256 Engineering Statistics 1</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</tbody>
</table>

**Second Semester**
- CE 403 Civil Engineering Project—Building Design (CW)  
- CE 463 Construction Cost Estimating  
- Senior (plan of study) elective \(^3\)  
- Humanities (HU); literature (L), or fine arts (FA) elective \(^3\)  

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<thead>
<tr>
<th>Course Description</th>
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<tbody>
<tr>
<td>CE 403 Civil Engineering Project—Building Design (CW)</td>
<td>3</td>
</tr>
<tr>
<td>CE 463 Construction Cost Estimating</td>
<td>3</td>
</tr>
<tr>
<td>Senior (plan of study) elective (^3)</td>
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<tr>
<td>Humanities (HU); literature (L), or fine arts (FA) elective (^3)</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
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**Total:** 25 hours

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\(^1\) Approved natural science (N) electives include: BSC 114/BSC 115, GEO 101, GEO 102, GEO 105, GY 101, and GY 102. **NOTE:** CH 102 can be added to this list for ArchB.

\(^2\) A 6-hour sequence in either HU/SE or HU/FA core classes is required. **Students are encouraged to consider EC 110 as an SB, CE 220 as an SB, and/or a foreign language as an HU.**

\(^3\) Senior (plan of study) electives must be 300- or above chosen from an approved list, which includes: CE 432, CE 436, CE 437, CE 438, CE 439, CE 444, CE 467, CE 468, CE 417, CE 418, ME 509, ME 416, ECE 493.

All architectural engineering students are strongly encouraged to prepare for and pass the Fundamentals of Engineering (FE) examination prior to graduation. A graduate of the program who has passed the FE exam would then be an Engineer Intern under Model Law as maintained by the National Council of Examiners for Engineering and Surveying (www.ncees.org). It is recommended that the FE be taken the semester prior to graduation.
PART I: ARCHITECTURAL ENGINEERING

A. BS Architectural Engineering Programs (ABET/EAC Accredited)

   1. California Polytechnic State University, San Luis Obispo
      San Luis Obispo, CA, US
   2. Drexel University
      Philadelphia, PA, US
   3. Illinois Institute of Technology
      Chicago, IL, US
   4. Kansas State University
      Manhattan, KS, US
   5. Milwaukee School of Engineering
      Milwaukee, WI, US
   6. Missouri University of Science and Technology (formerly University of Missouri-Rolla)
      Rolla, MO, US
   7. North Carolina Agricultural and Technical State University
      Greensboro, NC, US
   8. Oklahoma State University
      Stillwater, OK, US
   9. Pennsylvania State University
      University Park, PA, US
   10. Tennessee State University
       Nashville, TN, US
   11. Texas A & M University-Kingsville (formerly Texas A & I University)
       Kingsville, TX, US
   12. The University of Kansas (formerly University of Kansas)
       Lawrence, KS, US
   13. University of Colorado at Boulder
       Boulder, CO, US
   14. University of Miami
       Coral Gables, FL, US
   15. University of Oklahoma
       Norman, OK, US
   16. University of Texas at Austin
       Austin, TX, US
   17. University of Wyoming
       Laramie, WY, US

B. MS Architectural Engineering Program (ABET/EAC Accredited)

   1. University of Nebraska-Lincoln
      Lincoln, NE, US

C. Architectural Engineering ABET/EAC Program Criteria

   These program criteria apply to engineering programs including "architectural" and similar modifiers in their titles.
1. Curriculum

The program must demonstrate that graduates can apply mathematics through differential equations. This includes the use of models and applications in various fields such as engineering, physics, and economics. The curriculum is designed to ensure a strong foundation in mathematical theory and practical skills.
PART III: ADDITIONAL ABET INFORMATION

B. ABET GENERAL CRITERIA FOR BACHELORS LEVEL PROGRAMS

All programs seeking accreditation from the Engineering Accreditation Commission of ABET must demonstrate that they satisfy all of the following General Criteria for Bachelor's Level Programs:

Criterion 1. Students

Student performance must be evaluated. Student progress must be monitored to foster success in attaining student outcomes, thereby enabling graduates to attain program educational objectives. Students must be advised regarding curriculum and career matters.

The program must have and enforce policies for accepting both new and transfer students, awarding appropriate academic credit for courses taken at other institutions, and awarding appropriate academic credit for work in lieu of courses taken at the institution. The program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements.

Criterion 2. Program Educational Objectives

The program must have published program educational objectives that are consistent with the mission of the institution, the needs of the program's various constituencies, and these criteria. There must be a documented and effective process involving program constituencies, for the periodic review and revision of these program educational objectives.

Criterion 3. Student Outcomes

The program must have documented student outcomes that prepare graduates to attain the program educational objectives.

Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in lifelong learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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Criterion 4. Continuous Improvement

The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program.

Criterion 5. Curriculum

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:

(a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.

(b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student’s field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

(c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier coursework and incorporating appropriate engineering standards and multiple realistic constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.

Criterion 6. Faculty

The faculty must be of sufficient number and must have the competencies to cover all of the curricular areas of the program. There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, student advising and counseling, university service activities, professional development, and interactions with industry and professional practitioners, as well as employers of students.

The program faculty must have appropriate qualifications and must have and demonstrate sufficient authority to ensure the proper guidance of the program and to develop and implement processes for the evaluation, assessment, and continuing improvement of the program, its educational objectives and outcomes. The overall competence of the faculty may be judged by such factors as education, diversity of backgrounds, engineering experience, teaching effectiveness and experience, ability to communicate, enthusiasm for developing more:
effective programs; level of scholarship, participation in professional societies; and licensure as Professional Engineers.

Criterion 7. Facilities

Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

The library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty.

Criterion 8. Institutional Support

Institutional support and leadership must be adequate to ensure the quality and continuity of the program. Resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. The resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty. The resources available to the program must be sufficient to acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program, and to provide an environment in which student outcomes can be attained.

B. ABET GENERAL CRITERIA FOR MASTERS LEVEL PROGRAMS

Master's level programs must develop, publish, and periodically review educational objectives and student outcomes. The criteria for master's level programs are fulfillment of the baccalaureate level general criteria, fulfillment of program criteria appropriate to the master's level specialization area, and one academic year of study beyond the baccalaureate level. The program must demonstrate that graduates have the ability to apply master's level knowledge in a specialized area of engineering related to the program area.

C. FAQ for Master's Level Engineering Programs Seeking Accreditation (from ABET website)

This document provides advice with respect to certain criteria issues and the completion of the Self-Study Questionnaire for engineering programs that seek accreditation under the General Criteria for Masters Level Programs.

This document is advisory only and does not supersede or replace any part of the Criteria for Accrediting Engineering Programs. Accreditation decisions rest solely with the Engineering Accreditation Commission relative to the Criteria.

If you have any questions, please contact the Accreditation Department.

Must a five-year master's program meet all of the criteria for baccalaureate programs?

YES. The Masters Level Criteria require "fulfillment of the baccalaureate level general criteria."
In what ways, if any, must the program educational objectives and the student outcomes required for a master's program be different than those for a baccalaureate program?

6. Criterion 2 requires program educational objectives to be consistent with the mission of the program, the needs of the program’s various constituencies, and these criteria. Therefore, the objectives must be consistent with the required additional “one year of academic study beyond the baccalaureate level,” and demonstration that “graduates have an ability to apply master’s-level knowledge in a specialized area of engineering related to the program area.”

7. Criterion 3 requires the program to have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes [a] through [k] plus any additional outcomes that may be articulated by the program. Therefore, the outcomes must be consistent with the required additional “one year of academic study beyond the baccalaureate level,” and demonstration that “graduates have an ability to apply master’s-level knowledge in a specialized area of engineering related to the program area.”

8. Criterion 4 requires programs to regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. The required processes must use measurements that relate to the curriculum used by the program. Thus, a master’s-level program is expected to use measurements that relate to the master’s level curriculum for the applicable outcomes in addition to measurements taken from the parts of the curriculum normally associated with a baccalaureate program.

Must the “major design experience” required by Criterion 5 be separate from the demonstration of an ability to apply master’s level knowledge” required by General Criteria for Masters Level Programs?

These are two different requirements and are normally fulfilled through two different activities. Although there is no explicit prohibition of combining the two, the program must take care to assure all related requirements of the design experience are met when combined activities are used. Experience indicates programs that use individual project activities for the master’s level requirement have difficulty using this activity for the design experience.

Can a master’s program that admits only students with ABET accredited undergraduate degrees demonstrate only the requirements of the Masters Level Criteria in their assessment and evaluation activities and in the Self-Study Report submitted to ABET? May we assume that all requirements of the Baccalaureate Level Criteria have been met?

No. Fulfillment of the Baccalaureate-Level Criteria is still required and must be demonstrated as described below. All of Criterion 1 applies to the students in this type of program. In particular, the program must show evidence under Criterion 1 that they admit only students with ABET accredited undergraduate degrees. Any deviation from this restriction for this type of program would not be acceptable.

Criterion 2 requires program educational objectives to be consistent with the mission of the program, the needs of the program’s various constituencies, and these criteria. Therefore, the objectives must be consistent with the required “one year of academic study beyond the baccalaureate level,” and demonstration that “graduates have an ability to apply master’s-level knowledge in a specialized area of engineering related to the program area.”

Criterion 2 also requires a documented and effective process, involving program constituencies,
for the periodic review and revision of these program educational objectives. Thus, a master's program must meet this requirement relative to the constituencies of the master's program. Programs of the same discipline name that seek accreditation at both the baccalaureate and master's levels (dual level accreditation) must meet this requirement separately.

Criterion 3 requires the program to have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program. Therefore, the outcomes must be consistent with the required additional "one year of academic study beyond the baccalaureate level," and demonstration that "graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area."

Criterion 4 requires programs to regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. The required processes must use measurements that relate to all program educational objectives and to the student outcomes that relate to the curriculum used by the program. Thus, a master's level program that admits only students with ABET-accredited degrees must assess and evaluate all program educational objectives and only those outcomes that apply to the master's level curriculum.

Criterion 4 also requires that the results of these evaluations must be systematically utilized as input for the continuous improvement. Evidence of such actions for the master's program must be provided.

Criterion 5 requires a curriculum with components that are "appropriate to the discipline" and "appropriate to the student's field of study." The Master's Level Criterion requires demonstration of an "ability to apply master's level knowledge in a specialized area of engineering related to the program area." Thus, students that pursue a master level program in a "program area" different than their undergraduate degrees are expected to take baccalaureate level courses as needed for the master's level program.

Criteria 6, 7, 8, and 9 must be demonstrated relative to the "specialized area of engineering related to the program area."

How does a master's program that admits students with non-accredited undergraduate engineering and/or non-engineering degrees address the requirement to fulfill the baccalaureate level general criteria?

All of the requirements described above for programs that admit only students with ABET accredited undergraduate degrees also apply to this case.

In addition, provisions must be made for students with non-accredited undergraduate engineering and non-engineering degrees to take baccalaureate level courses as needed to fulfill all of the baccalaureate level general criteria and be adequately prepared to demonstrate an "ability to apply master's level knowledge in a specialized area of engineering related to the program area."

How do we use the Self-Study Questionnaire Template for a Masters Level accreditation?

1. The cover page should clearly show accreditation is sought relative to the General Criteria for Masters Level Programs. A section should be added at the outset of the Background Information section that informs the Program Evaluator that the program seeks Masters
Level accreditation and whether the program is a five-year program or a one-year program.

The admission requirements should be briefly described for a one-year program.

2. Information must be provided for all nine General Criteria for Baccalaureate-Level Programs. The questions answered and tables provided should be altered to provide the information required as described in the FAQs above.

3. Information must be provided for the section titled General Criteria for Masters-Level Programs.

Information must be provided for all Appendices. The questions answered and tables provided should be altered to provide information relative to the program.
THE UNIVERSITY OF ALABAMA

Resolution

NISP to Develop a New Bachelor of Science Degree in Environmental Engineering (CIP 14.1401)

WHEREAS, there is significant job growth and interest in environmental engineering in the state, region, and nationally; and

WHEREAS, there are 60 accredited Environmental Engineering degree programs in the U.S. but none in the State of Alabama; and

WHEREAS, there is high student demand for engineering-based environmental programs in the state and region; and

WHEREAS, due to the heightened awareness of environmental impact and many new environmental regulations designed to promote sustainability, a new degree program in Environmental Engineering will support economic development and benefit all industries in the state and region; and

WHEREAS, the new degree program is an outgrowth of The University of Alabama’s existing and highly popular minor in Environmental Engineering offered in the Department of Civil, Construction and Environmental Engineering; and

WHEREAS, the Department of Civil, Construction and Environmental Engineering offers the Master of Science in Environmental Engineering degree, and a new degree program will provide an undergraduate option to students;

NOW, THEREFORE, BE IT RESOLVED by The Board of Trustees of The University of Alabama that it supports the development of a proposal for a Bachelor of Science degree in Environmental Engineering at The University of Alabama.

BE IT FURTHER RESOLVED that it approves the submission of the Notice of Intent to Submit a Proposal (NISP) to the Alabama Commission on Higher Education for a new program leading to the Bachelor of Science degree in Environmental Engineering at The University of Alabama.
January 11, 2013

Chancellor Robert Witt
The University of Alabama System
401 Queen City Avenue
Tuscaloosa, Alabama 35401

Dear Chancellor Witt:

The College of Engineering wishes to plan two new baccalaureate degree programs in Environmental Engineering and Architectural Engineering. Dr. Kenneth J. Fridley and the faculty in the Department of Civil and Environmental Engineering have prepared the Notification of Intent to Submit a Proposal (NISP) as required by our Board of Trustees and the Alabama Commission on Higher Education. This proposal has the strong support of Dean Chuck Karr and Interim Provost Joe Benson. I am pleased to add my support for this initiative as I believe these academic programs are needed.

It is my understanding that subject to your review and approval, the NISPs must be approved by the Board of Trustees prior to submission to the Alabama Commission on Higher Education. Interim Provost Benson will be pleased to provide any additional information that you may need about the University's plans for these new programs.

Sincerely,

Judy Bonner
President

Enclosure

cc: Interim Provost Joe Benson
Dean Chuck Karr
Dr. Kenneth J. Fridley
MEMORANDUM

TO:       Judy Banner, Provost
FROM:     Charles L. Karr, Dean
SUBJECT:  Proposed New Baccalaureate Degree Programs in Environmental Engineering and Architectural Engineering

The Civil, Construction, and Environmental Engineering faculty propose to establish two new degree programs. Both proposed programs are outgrowths of minors currently offered in the department. I have attached four documents to this memorandum that provide detailed information on the two proposed programs:

1. A Notice of Intent to Submit a Proposal for a New Program of Instruction for the architectural engineering program,
2. A Notice of Intent to Submit a Proposal for a New Program of Instruction for the environmental engineering program,
3. A draft curricula for both programs, and
4. A listing of other accredited programs nationally with the accreditation criteria for both programs.

Each of these programs can be offered without the addition of new faculty. Further, we can offer an accredited degree program in architectural engineering without any additional course offerings. An accredited degree program in environmental engineering will require the addition of one new laboratory course — an effort that is currently underway to strengthen the existing minor in Environmental Engineering and Water Resources Engineering.

The faculty in the Department of Civil, Construction, and Environmental Engineering feel that the department is both qualified and adequately staffed to offer each of these new programs. Furthermore, they feel that by offering these programs they can continue to differentiate their department from other more traditional and single-dimensioned civil engineering programs in the state and the region. Finally, based on national enrollment data, these programs should substantially improve their ability to recruit the best and brightest students locally, regionally, and nationally, all with increased diversity since nationally these two programs have the highest percentage of women in engineering.

I support the two proposed programs. In particular, I feel that both programs would enhance our ability to recruit outstanding female students. Women in Science and Engineering reports that based on percentages, architectural engineering is the number one "mechanics" focused engineering program for females, and environmental engineering is the number one "chemistry" focused program for females. Further, offering a BS in Architectural Engineering would allow us to attract high-end students who have an interest in architecture. I feel these programs support the goals, vision, and mission of The University and will serve well the interests of the State of Alabama.
NOTE: Notification of Intent to Submit a Proposal (NISP) for a new program in Environmental Engineering

Alabama Commission on Higher Education

NOTIFICATION OF INTENT TO SUBMIT A PROPOSAL (NISP) FOR A NEW PROGRAM OF INSTRUCTION

1. Institution: The University of Alabama

2. Date of NISP Submission: October 18, 12

3. Institutional Contact Person: Kenneth J. Fridley
   Head, Civil, Construction & Environmental Engineering
   Telephone: 205-348-3585
   Fax: 205-348-0783
   E-mail: kfridley@eng.ua.edu

4. Program Identification:
   Title: Environmental Engineering
   Award: Bachelor of Science in Environmental Engineering
   CIP Code: 14.1491

5. Proposed Program Implementation Date: August 16, 2014
   It should be noted, however, that the freshman and sophomore years of the
   proposed program will be effectively the same as those of the civil engineering (CE)
   and construction engineering (ConE) programs, and very similar to that of other
   engineering programs as well. Therefore, students who start their academic studies
   prior to August 2014 may easily transfer into the proposed environmental
   engineering (EnvE) program.

6. Statement of Program Objectives (Objectives should be precise and stated in such
   a way that later evaluation/assessment of program outcomes is facilitated):
   Graduates of the program will be proficient in mathematics through
differential equations, probability and statistics, calculus-based physics,
general chemistry; an earth science, e.g., geology; meteorology, soil
science, relevant to the program of study; a biological science; e.g.,
microbiology, aquatic biology, toxicology, relevant to the program of study;
fluid mechanics relevant to the program of study; introductory level
knowledge of environmental issues associated with air, land, and water
systems and associated environmental health impacts; conducting
laboratory experiments and critically analyzing and interpreting data in more
than one major environmental engineering focus area, e.g., air, water, land,
environmental health; performing engineering design by means of design

Form Date: 8/20/01
Acad Poli/ed/ FM-NISP
experiences integrated throughout the professional component of the curriculum; to be proficient in advanced principles and practice relevant to the program objectives; understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

The above program objectives are based on current ABET/EAC program criteria for environmental engineering.

7. Relationship of program to other programs within the institution.

a. How will the program support or be supported by other programs within the institution?

Environmental engineering is an established field within engineering, but one that is that is traditionally supported educationally through other degree programs such as civil engineering. The proposed program will draw heavily from current course offerings in civil engineering, chemistry, biology and other sciences.

b. Will this program replace any existing program(s) or specialization(s), options or concentrations within existing programs? Yes: No: X

If yes, please explain. It should be noted, however, that this program is an outgrowth of The University's successful minor in environmental and water resources engineering offered within the civil engineering program. It is expected that the minor will remain in effect and even be enhanced for civil engineering and other majors interested in environmental engineering, and the proposed environmental engineering program will be directed towards engineering students whose focus and career choice is in the environmental area.

8. If this program is duplicative of any other programs in the state, please give your rationale for program duplication.

While a variety of programs focus on the environment in whole or in part, the proposed program in environmental engineering will be unique within the state. According to the US Department of Education, environmental engineering is an "Instructional program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for controlling contained living environments and for monitoring and controlling factors in the external natural environment, including pollution control, waste and hazardous material disposal, health and safety protection, conservation, life.
support, and requirements for protection of special materials and related work environments." By comparison, environmental science is defined as an "instructional program that describes the study of the biological and physical aspects of the environment and environment-related issues, including methods of abating or controlling environmental pollution and collateral damage." To further differentiate the proposed program, graduates will be eligible to seek licensure as a professional engineer (PE).

9. Do you plan to explore possible program collaboration with other institutions? Please explain.

Initially, no formal collaborations are proposed. As the program develops, collaborations with other institutions may result. Most likely, these collaborations will be initiated within the UA System in the form of shared courses via ITS (see below).

A significant issue facing collaborative programs is the accreditation process. The sharing of courses, making specific expertise faculty and program content available to students at other institutions, as well as drawing on other institutional expertise will be promoted with this program. However, accreditation issues suggest that the major courses, at least initially, would be best served being administered by one institution. The program as proposed will be accredited as an engineering degree program under the requirements set forth by the ABET Engineering Accreditation Council (ABET/EAC) and will be synchronized with and supported by the accreditation of the other engineering programs at UA, both in terms of the timing of reports and visitations as well as the institutional approach to outcomes and assessment.

10. Do you anticipate the use of distance education technology in the delivery of the program? Please explain.

In addition to traditional on-campus, synchronous course offerings, the environmental engineering degree program may use distance education technology.

First, it is expected that the course offerings specific to environmental engineering (e.g., senior-level required and elective environmental courses) will be of interest to other engineering students (e.g., civil engineering) at UAB and UAH. Environmental courses provided by other campuses would also be accepted as electives for the proposed program. The Department of Civil, Construction and Environmental Engineering has a long track record of utilizing ITS for collaborative course offerings in the environmental engineering area.

11. What methodology will you use to determine the level of student demand for this program?
Currently, there are 59 ABET/EAC-accredited environmental engineering programs in the U.S., including six in the Southeast. Of the six in the SE, three are in Florida and three are at SEC universities. To determine student demand, a review of historic enrollment data, available through the American Society for Engineering Education (ASEE), will be conducted. In addition to enrollment data, a review of student demographics will be included to assess potential positive impacts on diversity.

12. What methodology will you use to determine need for this program?

Projections by the U.S. Department of Labor indicates the employment demand for environmental engineers will continue to grow at a rate exceeding that for all technical professions through 2020. The demand for environmental engineers locally, regionally, and nationally will continue to increase. Additional data and reports from the Department of Labor will be evaluated and reported as part of the final proposal.

In addition, a survey of the state’s and region’s primary environmental employers, including both the public and private sectors will be conducted to validate the need for this program.

Certification

[Signature]
Chief Academic Officer

Graduate Dean (if this is a graduate program)

5/30/13
Date
ABET PROGRAM CRITERIA FOR ENVIRONMENTAL ENGINEERING

The program must prepare graduates to be proficient in mathematics through differential equations, probability and statistics, calculus-based physics, general chemistry, an earth science, e.g., geology, meteorology, soil science, relevant to the program of study; a biological science, e.g., microbiology, aquatic biology, toxicology; relevant to the program of study; fluid mechanics relevant to the program of study; introductory level knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts; conducting laboratory experiments and critically analyzing and interpreting data in more than one major environmental engineering focus area, e.g., air, water, land, environmental health; performing engineering design by means of design experiences integrated throughout the professional component of the curriculum; to be proficient in advanced principles and practice relevant to the program objectives; understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

DRAFT ENVIRONMENTAL ENGINEERING CURRICULUM

FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 121 Intro to Civil, Construction &amp; Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 111 Engineering the Future</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 131 Engineering Concepts and Design I</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 151 Fundamentals of Engineering Graphics</td>
<td>1</td>
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<tr>
<td>MATH 125 Calculus I (MA)</td>
<td>4</td>
</tr>
<tr>
<td>EN 101 English Composition I (FC)</td>
<td>3</td>
</tr>
<tr>
<td>CH 101 General Chemistry I (N)</td>
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Second Semester

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<tr>
<th>ENGR 141 Engineering Concepts and Design II</th>
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<tr>
<td>ENGR 171 Large-Scale Engineering Graphics</td>
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<tr>
<td>MATH 126 Calculus II (MA)</td>
<td>4</td>
</tr>
<tr>
<td>PH 105 General Physics with Calculus I (N)</td>
<td>4</td>
</tr>
<tr>
<td>EN 102 English Composition II (FC)</td>
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<td>History (HI) or social and behavioral sciences (SB) elective</td>
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SOPHOMORE YEAR

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<thead>
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<th>Hours</th>
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<tr>
<td>CE 260 Civil and Construction Engineering/Surveying</td>
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<tr>
<td>AEM 201 Statics</td>
<td>3</td>
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<tr>
<td>MATH 227 Calculus III (MA)</td>
<td>4</td>
</tr>
<tr>
<td>CH 102 General Chemistry II (N)</td>
<td>4</td>
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<tr>
<td>Humanities (HU), literature (L), or fine arts (FA) elective</td>
<td>3</td>
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<tr>
<td></td>
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Second Semester
CE 262 Civil and Construction Engineering Materials: 3
AEM 250 Mechanics of Materials I 3
AEM 264 Dynamics 3
MATH 238 Applied Differential Equations I (MA) 3
Approved earth science (N) elective 4

An "earth science" is required; list differs from BSCE

JUNIOR YEAR

First Semester
CE 320 Introduction to Environmental Engineering 3
AEM 311 Fluid Mechanics 3
GES 255 Engineering Statistics I 3
BSC 114 Principles of Biology 3
BSC 115 Principles of Biology I Lab 1
History (HI) or social and behavioral sciences (SB) elective 3

First Semester
CE 378 Water Resources Engineering 3
CE 425 Air Pollution 3
CE 340 Geotechnical Engineering 4
ME 216 Thermo Engineering Survey 3
History (HI) or social and behavioral sciences (SB) elective 3

SENIOR YEAR

First Semester
CE 422 Solid and Hazardous Waste 3
CE 424 Water and Wastewater Treatment 3
CE 475 Hydrology 3
CE ### Environmental Engineering Laboratory 3
Senior (plan of study) elective 3

Second Semester
CE 401 Civil Engineering Project—Site Design (GW) 4
Senior (plan of study) electives 3
COM 123 Public Speaking (HU) 3
Humanities (HU), Literature (L), or fine arts (FA) elective 3

Total: 128 hours

1Approved natural science (N) electives include: BSC 114/BSC 115, GEO 101, GEO 102, GEO 105, GY 101, and GY 102. NOTE: ABET required a biological science and an earth science; BSC 114 is included but not the lab (BSC 115) just based on credit hour considerations.

2A 6-hour sequence in either HI/SA or HU/FA core classes is required. Students are encouraged to consider EC 110 as an SB, CE 220 as an SB, and/or a foreign language as an HU

3Senior (plan of study) electives must be 300-or above chosen from an approved list, which includes:

All environmental engineering students are strongly encouraged to prepare for and pass the Fundamentals of Engineering (FE) examination prior to graduation. A graduate of the program who has passed the FE exam would then be an Engineer Intern under Model Law as maintained by the National Council of Examiners for
Engineering and Surveying (www.ncees.org). It is recommended that the FE be taken the semester prior to graduation.
PART II: ENVIRONMENTAL ENGINEERING

A. BS Environmental Engineering Programs (ABET/EAC Accredited)

1. California Polytechnic State University, San Luis Obispo
   San Luis Obispo, CA, US
2. City University of New York, City College
   New York, NY, US
3. Clarkson University
   Potsdam, NY, US
4. Colorado State University
   Fort Collins, CO, US
5. Columbia University
   New York, NY, US
6. Cornell University
   Ithaca, NY, US
7. Drexel University
   Philadelphia, PA, US
8. Florida Gulf Coast University
   Fort Myers, FL, US
9. Florida International University [Modesto Maidique Campus]
   Miami, FL, US
10. Gannon University
    Erie, PA, US
11. Georgia Institute of Technology
    Atlanta, GA, US
12. Humboldt State University
    Arcata, CA, US
13. Lehigh University
    Bethlehem, PA, US
14. Louisiana State University and A&M College
    Baton Rouge, LA, US
15. Manhattan College
    Riverdale, NY, US
16. Massachusetts Institute of Technology
    Cambridge, MA, US
17. Michigan Technological University
    Houghton, MI, US
18. Missouri University of Science and Technology [Formerly University of Missouri-Rolla]
    Rolla, MO, US
19. Montana Tech of the University of Montana
    Butte, MT, US
20. New Mexico Institute of Mining and Technology
    Socorro, NM, US
21. North Carolina State University at Raleigh
    Raleigh, NC, US
22. Northern Arizona University
   Flagstaff, AZ, US
23. Northwestern University
   Evanston, IL, US
24. Old Dominion University
   Norfolk, VA, US
25. Oregon State University
   Corvallis, OR, US
26. Pennsylvania State University
   University Park, PA, US
27. Pennsylvania State University, Harrisburg, The Capital College
   Middletown, PA, US
28. Rensselaer Polytechnic Institute
   Troy, NY, US
29. Rutgers, The State University of New Jersey
   New Brunswick, NJ, US
30. San Diego State University
   San Diego, CA, US
31. South Dakota School of Mines and Technology
   Rapid City, SD, US
32. Southern Methodist University
   Dallas, TX, US
33. Stanford University
   Stanford, CA, US
34. State University of New York at Buffalo
   Buffalo, NY, US
35. Stevens Institute of Technology
   Hoboken, NJ, US
36. Syracuse University
   Syracuse, NY, US
37. Tarleton State University
   Stephenville, TX, US
38. The Johns Hopkins University
   Baltimore, MD, US
39. The Ohio State University
   Columbus, OH, US
40. Tufts University
   Medford, MA, US
41. United States Air Force Academy
   USAFA, CO, US
42. United States Military Academy
   West Point, NY, US
43. University of California, Irvine
   Irvine, CA, US
44. University of California, Riverside
   Riverside, CA, US
45. University of Central Florida
   Orlando, FL, US
46. University of Colorado at Boulder  
   Boulder, CO, US
47. University of Connecticut  
   Storrs, CT, US
48. University of Delaware  
   Newark, DE, US
49. University of Florida  
   Gainesville, FL, US
50. University of Miami  
   Coral Gables, FL, US
51. University of Nevada–Reno  
   Reno, NV, US
52. University of New Hampshire  
   Manchester, NH, US
53. University of Oklahoma  
   Norman, OK, US
54. University of Southern California  
   Los Angeles, CA, US
55. University of Vermont  
   Burlington, VT, US
56. University of Wisconsin–Platteville  
   Platteville, WI, US
57. Utah State University  
   Logan, UT, US
58. Wilkes University  
   Wilkes-Barre, PA, US
59. Worcester Polytechnic Institute  
   Worcester, MA, US

B. MS Environmental Engineering Program (ABET/EAC Accredited)

1. Air Force Institute of Technology  
   Wright-Patterson Air Force Base, OH, US
2. Manhattan College  
   Riverdale, NY, US
3. Texas Tech University  
   Lubbock, TX, US
4. University of Arkansas  
   Fayetteville, AR, US
5. University of Cincinnati  
   Cincinnati, OH, US

C. Environmental Engineering ABET/EAC Program Criteria

These program criteria apply to engineering programs including "environmental", "sanitary", or similar modifiers in their titles.
1. Curriculum

The program must prepare graduates to be proficient in mathematics through differential equations, probability and statistics, calculus-based physics, general chemistry, an earth science, e.g., geology, meteorology, soil science, relevant to the program of study; a biological science, e.g., microbiology, aquatic biology, toxicology, relevant to the program of study; fluid mechanics relevant to the program of study; introductory level knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts; conducting laboratory experiments and critically analyzing and interpreting data in more than one major environmental engineering focus area, e.g., air, water, land, environmental health; performing engineering design by means of design experiences integrated throughout the professional component of the curriculum; to be proficient in advanced principles and practice relevant to the program objectives; understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

2. Faculty

The program must demonstrate that a majority of those faculty teaching courses which are primarily design in content are qualified to teach the subject matter by virtue of professional licensure, or by education and equivalent design experience.
PART III: ADDITIONAL ABET INFORMATION

B. ABET GENERAL CRITERIA FOR BACHELORS LEVEL PROGRAMS

All programs seeking accreditation from the Engineering Accreditation Commission of ABET must demonstrate that they satisfy all of the following General Criteria for Baccalaureate Level Programs.

Criterion 1. Students

Student performance must be evaluated. Student progress must be monitored to foster success in attaining student outcomes, thereby enabling graduates to attain program educational objectives. Students must be advised regarding curriculum and career matters.

The program must have and enforce policies for accepting both new and transfer students, awarding appropriate academic credit for courses taken at other institutions, and awarding appropriate academic credit for work in lieu of courses taken at the institution. The program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements.

Criterion 2. Program Educational Objectives

The program must have published program educational objectives that are consistent with the mission of the institution, the needs of the program’s various constituencies, and these criteria. There must be a documented and effective process, involving program constituencies, for the periodic review and revision of these program educational objectives.

Criterion 3. Student Outcomes

The program must have documented student outcomes that prepare graduates to attain the program educational objectives.

Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, tools, and modern engineering software needed for engineering practice
Criterion 4. Continuous Improvement

The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program.

Criterion 5. Curriculum

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:

(a) one year of a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.

(b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between the basic sciences and the engineering sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

(c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.

Criterion 6. Faculty

The faculty must be of sufficient number and must have the competencies to cover all of the curricular areas of the program. There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, student advising and counseling, university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students.

The program faculty must have appropriate qualifications and must have and demonstrate sufficient authority to ensure the proper guidance of the program and to develop and implement processes for the evaluation, assessment, and continuing improvement of the program, its educational objectives and outcomes. The overall competence of the faculty may be judged by such factors as education, diversity of backgrounds, engineering experience, teaching effectiveness and experience, ability to communicate, enthusiasm for developing more
effective programs, level of scholarship, participation in professional societies, and licensure as Professional Engineers.

**Criterion 7. Facilities**

Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

The library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty.

**Criterion 8. Institutional Support**

Institutional support and leadership must be adequate to ensure the quality and continuity of the program.

Resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. The resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty. The resources available to the program must be sufficient to acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program, and to provide an environment in which student outcomes can be attained.

**B. ABET GENERAL CRITERIA FOR MASTERS LEVEL PROGRAMS**

Master's level programs must develop, publish, and periodically review, educational objectives and student outcomes. The criteria for master's level programs are fulfillment of the baccalaureate level general criteria, fulfillment of program criteria appropriate to the masters level specialization area, and one academic year of study beyond the baccalaureate level. The program must demonstrate that graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area.

**C. FAQ for Master's Level Engineering Programs Seeking Accreditation (from ABET website)**

This document provides advice with respect to certain criteria issues and the completion of the Self-Study Questionnaire for engineering programs that seek accreditation under the General Criteria for Masters Level Programs:

This document is advisory only and does not supersede or replace any part of the Criteria for Accrediting Engineering Programs. Accreditation decisions rest solely with the Engineering Accreditation Commission relative to the Criteria.

If you have any questions, please contact the Accreditation Department.

Must a five-year master's program meet all of the criteria for baccalaureate programs?

YES. The Masters Level Criteria require "fulfillment of the baccalaureate level general criteria".
In what ways, if any, must the program educational objectives and the student outcomes required for a master's program be different than those for a baccalaureate program?

6. Criterion 2 requires program educational objectives to be consistent with the mission of the program, the needs of the program's various constituencies, and these criteria. Therefore, the objectives must be consistent with the required additional "one year of academic study beyond the baccalaureate level," and demonstration that "graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area."

7. Criterion 3 requires the program to have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program. Therefore, the outcomes must be consistent with the required additional "one year of academic study beyond the baccalaureate level," and demonstration that "graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area."

8. Criterion 4 requires programs to regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. The required processes must use measurements that relate to the curriculum used by the program. Thus, a master's level program is expected to use measurements that relate to the master's level curriculum for the applicable outcomes in addition to measurements taken from the parts of the curriculum normally associated with a baccalaureate program.

Must the "major design experience" required by Criterion 5 be separate from the demonstration of "an ability to apply master's level knowledge" required by General Criteria for Masters Level Programs?

These are two different requirements and are normally fulfilled through two different activities. Although there is no explicit prohibition of combining the two, the program must take care to assure all related requirements of the design experience are met when combined activities are used. Experience indicates programs that use individual project activities for the master's level requirement have difficulty using this activity for the design experience.

Can a master's program that admits only students with ABET accredited undergraduate degrees demonstrate only the requirements of the Masters Level Criteria in their assessment and evaluation activities and in the Self-Study Report submitted to ABET? May we assume that all requirements of the Baccalaureate Level Criteria have been met?

NO. Fulfillment of the Baccalaureate Level Criteria is still required and must be demonstrated as described below. All of Criterion 1 applies to the students in this type of program. In particular, the program must show evidence under Criterion 1 that they admit only students with ABET accredited undergraduate degrees. Any deviation from this restriction for this type of program would not be acceptable.

Criterion 2 requires program educational objectives to be consistent with the mission of the program, the needs of the program's various constituencies, and these criteria. Therefore, the objectives must be consistent with the required "one year of academic study beyond the baccalaureate level," and demonstration that "graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area."

Criterion 2 also requires a documented and effective process, involving program constituencies,
for the periodic review and revision of these program educational objectives. Thus, a master's program must meet this requirement relative to the constituencies of the master's program. Programs of the same discipline name that seek accreditation at both the baccalaureate and master's levels [dual level accreditation] must meet this requirement separately.

Criterion 3 requires the program to have documented student outcomes that prepare graduates to attain the educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program. Therefore, the outcomes must be consistent with the required additional "one year of academic study beyond the baccalaureate level," and demonstration that "graduates have an ability to apply master's level knowledge in a specialized area of engineering related to the program area."

Criterion 4 requires programs to regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. The required processes must use measurements that relate to all program educational objectives and to the student outcomes that relate to the curriculum used by the program. Thus, a master's level program that admits only students with ABET accredited degrees must assess and evaluate all program educational objectives and only those outcomes that apply to the master's level curriculum.

Criterion 4 also requires that the results of these evaluations must be systematically utilized as input for the continuous improvement. Evidence of such actions for the master's program must be provided.

Criterion 5 requires a curriculum with components that are "appropriate to the discipline" and "applicable to the student's field of study." The Master's Level Criteria require demonstration of an "ability to apply master's level knowledge in a specialized area of engineering related to the program area." Thus, students that pursue a master's level program in a "program area" different from their undergraduate degrees are expected to take baccalaureate level courses as needed for their master's level program.

Criteria 6, 7, 8, and 9 must be demonstrated relative to the "specialized area of engineering related to the program area."

How does a master's program that admits students with non-accredited undergraduate engineering and/or non-engineering degrees address the requirement to fulfill the baccalaureate level general criteria?

All of the requirements described above for programs that admit only students with ABET accredited undergraduate degrees also apply to this case.

In addition, provisions must be made for students with non-accredited undergraduate engineering and non-engineering degrees to take baccalaureate level courses as needed to fulfill all of the baccalaureate level general criteria and be adequately prepared to demonstrate an "ability to apply master's level knowledge in a specialized area of engineering related to the program area."

How do we use the Self-Study Questionnaire Template for a Masters level accreditation?

1. The cover page should clearly show accreditation is sought relative to the General Criteria for Master's Level Programs. A section should be added at the outset of the Background Information section that informs the Program Evaluator that the program seeks Masters
Level accreditation and whether the program is a five-year program or a one-year program. The admission requirements should be briefly described for a one-year program.

2. Information must be provided for all nine General Criteria for Baccalaureate Level Programs. The questions answered and tables provided should be altered to provide the information required as described in the FAQs above.

3. Information must be provided for the section titled General Criteria for Masters Level Programs.

Information must be provided for all Appendices. The questions answered and tables provided should be altered to provide information related to the program.