1. Attendance:
Aero – J. P. Chen
AVN – Not Present (Chul Lee)
BME – Rita Aleviadou
CHE – Dave Tomasko
CEGS – Robert Sykes
CSE – Bruce Weide
ECE – George Valco
ENG PHY – Not Present (Richard Hughes)
FAB – Not Present (Alfred Soboyejo)
IWSE –
ISE – Blaine Lilly
WLD – Not Present (Charley Albright)
MSE – Rudy Buckheit (for Rob Wagoner)
ME – Mike Moran
Graduate Student(s) – Shivraman Giri, Justin McKendry
Undergraduate Student(s) – Sijia Wang (Not present Ashley Hand)
Secretary – Bob Gustafson (for Ed McCaul)
Guests – Pam Hussen, Linda Weavers, John Lenhart

2. Minutes - The minutes of the 26 May 2006 meeting were approved as distributed.

3. Introductions - All persons present introduced themselves and their affiliation.

4. Draft CCAA Handbook – The draft handbook was distributed with the agenda for the meeting (in two pieces). Gustafson reported that this was an effort by Ed McCaul to assist us by assembling useful document in one place. It should somewhat serve the function at the college level of the OAA Handbook. Chair Weide asked members to look over the handbook and get any suggested revision or additions back to Ed.

5. Duties and Responsibilities of CCAA – Weide asked that the committee review the charge to the committee (page 1 and 2 of the handbook). A question had been raised if the relation to Knowlton School needed to be clarified. This can be discussed at a future meeting.

6. College of Medicine – After discussion, it was moved that we discontinue requesting a liaison with the College of Medicine serve on the committee. The motion passed with no negative votes and one abstention.

(attached) was introduced by Moran. Sykes moved to approve the Environmental Engineering BS degree proposal. The motion was seconded. As part of discussion, Sykes overviewed a document entitled “Response to Subcommittee A” (attached). A “Call for the question on the motion” was defeated. A motion to table was passed.

8. Potential for Creating an Engineering Studies Minor – Item deferred for a future meeting

9. Credit Hours vs. Work Required – Item deferred for a future meeting.

10. GEC Developments – Gustafson reported that a group of representatives from all colleges (mostly associate deans) has met several times at the request of Randy Smith in OAA to discuss follow up to the McHale Report. Topics include 1) oversight mechanism, 2) credits to degree minimum – proposed 180, 3) freshman cluster, and 4) flexibility. Gustafson recommended no specific action at this time. He will keep the committee informed of developments. Gustafson also reported that no action has been taken by CAA regarding the remaining elements of our pending GEC revision proposal.

C: College Faculty
   CCAA File
Comments on the proposed CEEGS degree: Bachelor of Science in Environmental Engineering (BSEnvE)

Submitted by: M. J. Moran
September 19, 2006

MAJORITY POSITION

Recommendation: The proposal should not be approved because the rationale is weak, there are deficiencies in the proposed course of study, and the benefits to students are not demonstrated.

INTRODUCTION:

What we know today as Civil Engineering descends from the original engineering specialty that was concerned with bridges and other structures. As a formal area of study it has endured for over two hundred years and today is one of the most recognized and respected of all fields of engineering. Civil Engineering is a field where licensing for professional practice is the norm. It also is a field where employment opportunities for B.S. degree holders have been consistently available.

At Ohio State, Civil Engineering is housed in the vibrant CEEGS department that also includes Geodetic Science and an option program in Environmental Engineering. The proposal before CCAA relates to the conversion of the existing environmental engineering option to a new degree program awarding the Bachelor of Science in Environmental Engineering (BSEnvE).

When high schoolers think about taking engineering at the university level, the three things that they, and their parents, have in mind is jobs, jobs, jobs. Few are aware of the horizon-widening experience that awaits them, including possibilities like combining engineering with business or medicine and an array of exciting postgraduate education opportunities. Still, in the end most graduates opt for a good job, if one presents itself. This is the reality that must be kept foremost when evaluating new undergraduate degree programs.

Students receiving the BSCE degree together with the current Environmental Engineering Option broaden their chances for employment – at graduation and in years ahead, for they can point to a course of study in the environmental area within a traditional degree program. Indeed, on p.16 of the CEEGS Curriculum Guide & Curriculum Options for Undergraduates document students in the Environmental Engineering Option are advised to include a note to that effect on their resumes. Some jobs in the environmental field also would be within reach of BSCE holders having only a judicious selection of related environmental coursework but not the full option.
On the other hand, BSEnvE graduates face a diminished likelihood of traditional CE-related employment, and may not even qualify if a P.E. in Civil is a requirement. Also, because some employers may not be able to tell (or want to tell) the difference, BSEnvE graduates may find themselves competing for employment at less-than-engineering salaries with individuals having some environmental-related coursework but little, or no, engineering training. It’s worth noting in passing that the existing CEEGS Environmental Engineering Minor opens the door for students in engineering and non-engineering majors alike to obtain at least a toe-hold in competing for jobs in the field, which perhaps is an unforeseen result of establishing such a minor.

RATIONAL AND COURSE OF STUDY:

Next, the Rationale provided in the proposal and the proposed Course of Study are considered.

Rationale. On p. 8 of the proposal, five reasons are given for replacing the current Environmental Engineering Option with a full-blown BSEnvE degree program. On the whole the reasons are technical in nature and weakly supported. The benefits for the B.S.-level students who would be affected by such a change are not apparent. Considering the five reasons in turn:

1. Although it’s reasonable for four-year baccalaureate programs in Environmental Engineering to lead to the BSEnvE degree and be accredited by ABET, this is not a compelling reason for converting a successful option within Civil Engineering to a four-year BSEnvE program.

2. Whether or not the Environmental Engineering Option within Civil is ABET accredited, BSCE graduates in the option program will have an accredited BSCE degree. Further, as indicated by footnote 26, on page 39, BSCE graduates in the option program are currently eligible to take the P.E. exam in Environmental Engineering.

3. While collateral benefits for the Civil Engineering graduate program in the environmental area may result from the new degree program, such benefits have little bearing on the decision to develop a new undergraduate degree.

4. At several points claims are made that the new degree will improve “visibility” and enhance recruitment. But this overlooks the fact that the “Environmental Engineering” is already prominent in the departmental name. These claims invite questions about how other departments with special programs are able to get their messages out---manufacturing in Industrial and automotive in M.E., for example. In the end, it’s the responsibility of the departmental administration, including the adviser cadre, to disseminate information in a timely manner about programs. Finally, it’s noteworthy that as
recently as 1998 the current Environmental Engineering Option was ranked 6<sup>th</sup> among 32 like undergraduate programs (p. 36), which suggests considerable visibility at that time.

5. This point is totally unsupported. In any event, hoped-for research funding has little bearing on the decision to develop a new undergraduate degree.

Course of Study. Referring to pp. 9, 62, and 113-114 deficiencies in the proposed BSEnvE degree course of study can be identified.

1. ECE 300 (Electrical Circuits), required for the BSCE, is not required for the BSEnvE degree. This should be reviewed in light of instrumentation needs in some areas of practice in environmental engineering.

2. ME 500 (Engineering Thermal Sciences), required for the BSCE, is not required for the BSEnvE degree. This also should be reviewed in light of essential background required in some areas of practice.

3. The Chemistry requirement appears insufficient. Here, the recommendations of the Department of Chemistry, communicated by Prof. John Parsons, should be addressed with a view toward ensuring there is an adequate background in chemistry to support professional practice.

4. The BSEnvE program requires at least 19 cr. hr. of technical electives selected from the list on pp. 113-114. In view of the typically highly-structured technical elective lists in the BSCE program, some guidance for students should be provided for navigating the list on pp. 113-114.

ADDITIONAL COMMENTS:

Ohio State is a university with an international reach. Accordingly, surveys limited to practitioners in central Ohio (pp. 13-14) and a sparse sampling of students at Ohio State (pp. 18-19) fall far short of what is needed to justify a new degree program. Only 23 practitioners responded to a questionnaire placed in the newsletter of the Central Ohio section of the American Society of Civil Engineers and on the Society's website. The responses are in the main equivocal. The letter (on Burgess & Niple letterhead) from the department’s Environmental Engineering Advisory Committee ends weakly with, “The program will provide graduates that have a more specialized degree to employers wishing to hire Environmental Engineering as a separate discipline.” [italics added]

Enrollment data provided for undergraduate environmental engineering programs (including Ohio State) in Table 11 (pp. 84-86) indicate median and average enrollments of 34 and 51, respectively. The U.S. Department of
Education reports that in 2002-2003 some 474 BSEnvE degrees were awarded in the U.S. (R. Sykes). These are relatively small numbers, suggesting that existing programs meet a need but are unlikely engines for significant development at the respective institutions.

Although the proposal suggests (but does not explicitly state) that the new degree will be cost-wise neutral, experience with other such efforts strongly indicates that there will be costs to launch and sustain it. In view of the success of the current option program, the few student-directed benefits resulting from converting the existing option to a distinct degree, and expected costs, the justification for a new degree is not apparent.

MINORITY POSITION

The first 20 pages need to do a better job of justifying the new program. There are too many statements presented as fact with little if any supporting argument or citation of references. A better job of anticipating arguments and putting them to bed early will make the document much stronger. The supporting material in the last 2/3 of the document is good. Just boil it down and put more of it into the first 20 pages.

I cannot accept the proposal in the current form. Better justification presented in the first 20 pages could, however, make it an acceptable document.

Specific comments:

Page 9 - a little more explanation and justification

Page 12 - the numbers represent what % of total faculty?

Page 13 & 14 - a little more on Ohio and national demand for EnvE's here

Page 20 and on - more letters of support & concurrence, no blank pages

Page 30, 2nd paragraph - a little more explanation and justification

Page 33, last paragraph - expand argument with citations

Page 35, top of page - how strengthen?
What we know today as Civil Engineering descends from the original engineering specialty that was concerned with bridges and other structures. As a formal area of study it has endured for over two hundred years and today is one of the most recognized and respected of all fields of engineering. Civil Engineering is a field where licensing for professional practice is the norm. It also is a field where employment opportunities for B.S. degree holders have been consistently available.

Two hundred years ago there was only engineering. The selfsame individuals in one year designed bridges, in another steam engines, in another canals, in another windmills.

As technology evolved, the accumulation of knowledge exceeded what a single person could master, and new professions were established. Well before the Civil War, Civil and Mechanical engineering parted ways, and after the Civil War, the developments in the Industrial Revolution and the mechanization of agriculture led to the establishment of agricultural, electrical, chemical and industrial engineering. As knowledge and technique increase, so does specialization.

Environmental Engineering is now widely recognized as a distinct discipline, separate and unique from Civil Engineering. The traditional discipline of Sanitary Engineering focused primarily on water and wastewater treatment, water distribution systems and wastewater collection systems. The modern field of Environmental Engineering evolved in response to environmental concern and legislation in the 1970s and in addition to traditional sanitary and water resource topics now covers wildlife conservation, air pollution, soil and groundwater remediation, toxicology, risk assessment, regional and global-scale contaminant transport. The increasing complexity of the problems and engineering solutions has produced an infusion of practitioners outside of Civil Engineering.

ABET and NCEES both recognize Environmental Engineering as a distinct profession.

ABET has criteria that separate Civil Engineering from Environmental Engineering, and the lead organization for Environmental Engineering is no longer ASCE but the American Academy of Environmental Engineers. NCEES supervises both Part I (FE) and Part II (Practice) Examinations in Environmental Engineering, and Environmental Engineering is recognized as a separate discipline by the US departments of Education, Labor and Defense.

When high schoolers think about taking engineering at the university level, the three things that they, and their parents, have in mind is jobs, jobs, jobs. Few are aware of the horizon-widening experience that awaits them, including possibilities like combining engineering with business or medicine and an array of exciting postgraduate education opportunities. Still, in the end most graduates opt for a good job, if one presents itself. This is the reality that must be kept foremost when evaluating new undergraduate degree programs.
The US Depts. of Education, Labor and Defense all recognize the Environmental Engineering profession as a separate engineering discipline. DOL statistics indicate that within the last year or two there were about 1500 BS level Environmental Engineering position advertised each year. The DOL also maintains statistics on MS and PhD level environmental engineering positions. The DOE statistics show that less than 500 BSEnE degrees are awarded each year. Furthermore, The USDOL, ranks environmental engineering as either the first or second fastest growing engineering profession, with computer science/engineering as the other.

Students receiving the BSCE degree together with the current Environmental Engineering Option broaden their chances for employment – at graduation and in years ahead, for they can point to a course of study in the environmental area within a traditional degree program. Indeed, on p.16 of the CEEGS Curriculum Guide & Curriculum Options for Undergraduates document students in the Environmental Engineering Option are advised to include a note to that effect on their resumes. Some jobs in the environmental field also would be within reach of BSCE holders having only a judicious selection of related environmental coursework but not the full option.

On the other hand, BSEnvE graduates face a diminished likelihood of traditional CE-related employment, and may not even qualify if a P.E. in Civil is a requirement. Also, because some employers may not be able to tell (or want to tell) the difference, BSEnvE graduates may find themselves competing for employment at less-than-engineering salaries with individuals having some environmental-related coursework but little, or no, engineering training. It’s worth noting in passing that the existing CEEGS Environmental Engineering Minor opens the door for students in engineering and non-engineering majors alike to obtain at least a toe-hold in competing for jobs in the field, which perhaps is an unforeseen result of establishing such a minor.

In fact the opposite is true. Skills needed for environmental engineering positions continue to diverge from traditional civil engineering. To best serve students seeking environmental engineering positions, a BSEnE degree is superior to the professional skills they would obtain from BSCE coursework.

Cases exist where graduates of our current Environmental Engineering Option have included students that already had a degree in an environmental field but were unsatisfied with their career prospects. These students have completed a second undergraduate degree in order to be able to obtain the engineering jobs they desire. Comments from these students indicate that they would have studied environmental engineering for their first degree had they known it existed suggesting that improving the visibility would better serve students. Generally, non-engineers do not compete with individuals having no engineering training.

RATIONALE AND COURSE OF STUDY:

Next, the Rationale provided in the proposal and the proposed Course of Study are considered.
Rationale. On p. 8 of the proposal, five reasons are given for replacing the current Environmental Engineering Option with a full-blown BSEnvE degree program. On the whole the reasons are technical in nature and weakly supported. The benefits for the B.S.-level students who would be affected by such a change are not apparent. Considering the five reasons in turn:

1. Although it’s reasonable for four-year baccalaureate programs in Environmental Engineering to lead to the BSEnvE degree and be accredited by ABET, this is not a compelling reason for converting a successful option within Civil Engineering to a four-year BSEnvE program. The fact of the matter is that it will be very difficult, if not impossible, to maintain the existing option given the natural evolution of the environmental engineering field away from traditional civil engineering. This is clearly evident in the requirements needed to maintain our ABET Environmental Engineering program and from comments by ABET during our last few reviews. In fact, after the last ABET review our program no longer has any free technical electives, and we are just barely meeting the program requirements. The shift away from Civil Engineering is also demonstrated by the increased knowledge of environmental engineering required to pass Environmental Engineering PE exam. Clearly, to best serve our students we need a comprehensive program of study in Environmental Engineering, not a program diluted by Civil Engineering courses that will likely never be utilized over the course of their careers.

2. Whether or not the Environmental Engineering Option within Civil is ABET accredited, BSCE graduates in the option program will have an accredited BSCE degree. Further, as indicated by footnote 26, on page 39, BSCE graduates in the option program are currently eligible to take the P.E. exam in Environmental Engineering.

As noted above, we would be doing our students a disservice if we did not offer them the best program possible to prepare them to take the PE exam in environmental engineering. Students taking a course of study leading to BSCE and accredited under civil would be poorly prepared to take the PE exam in Environmental Engineering. Students in such a program would also be less desirable to potential employers as the professional skills required for environmental engineering practice continue to move away from civil engineering.
3. While collateral benefits for the Civil Engineering graduate program in the environmental area may result from the new degree program, such benefits have little bearing on the decision to develop a new undergraduate degree.

For those graduates interested in furthering their education, the revised curriculum and BsEnE degree will enhance their ability to secure admission into top-ranked programs. It should be noted that graduates on other degree programs, like Civil Engineering and Chemical Engineering, need remedial training at the graduate school level, which reduces the amount of instruction they could have gotten in environmental engineering.

4. At several points claims are made that the new degree will improve “visibility” and enhance recruitment. But this overlooks the fact that the “Environmental Engineering” is already prominent in the departmental name. These claims invite questions about how other departments with special programs are able to get their messages out---manufacturing in Industrial and automotive in M.E., for example. In the end, it’s the responsibility of the departmental administration, including the adviser cadre, to disseminate information in a timely manner about programs. Finally, it’s noteworthy that as recently as 1998 the current Environmental Engineering Option was ranked 6th among 32 like undergraduate programs (p. 36), which suggests considerable visibility at that time.

The OSU Webpage is the gateway to academic programs within the university and is generally the first place prospective students look for information about our programs. Currently, the University only lists labeled BS degrees not ABET-accredited programs. So, when a future student looks for “environmental engineering” it is not listed under “majors” nor are there any courses labeled as “environmental engineering.” The College of Engineering and the Department of Civil & Environmental Engineering and Geodetic Science follow the same practice: Environmental Engineering is buried because it is not a BS degree program

Look as the Course Bulletin. There is no mention of Environmental Engineering. Several years ago, CEEGS was able to put a Heading labeled “Environmental Engineering” in the Course Bulletin, but in subsequent years the Heading was removed because there was no BSEnE degree.

Listed majors and course labels are arguably the two single-most visible elements of any program at the university. The efficient and reasonable way to change this, and to significantly enhance visibility, is to have a labeled degree program in environmental engineering.

5. This point is totally unsupported. In any event, hoped-for research funding has little bearing on the decision to develop a new undergraduate degree.

We retract this statement.

Course of Study. Referring to pp. 9, 62, and 113-114 deficiencies in the proposed BSEnvE degree course of study can be identified.
1. ECE 300 (Electrical Circuits), required for the BSCE, is not required for the BSEnvE degree. This should be reviewed in light of instrumentation needs in some areas of practice in environmental engineering.

*Feedback from practicing Environmental Engineers indicated that the program would better serve student needs by eliminating this as a required course, in order to be able focus on more environmental-specific topics. However, we do now list ECE 300 as a potential technical elective in the program.*

*More importantly, we have accepted the Dept of Chemistry recommendation regarding CHEM 520 and 521 (Physical Chemistry). Physical Chemistry much more relevant to environmental thermodynamics and analytical instrumentation than ME 500 and EE 300.*

*Also, the current strategic plan for the BSCE program is to eliminate the requirement for EE 300.*

2. ME 500 (Engineering Thermal Sciences), required for the BSCE, is not required for the BSEnE degree. This also should be reviewed in light of essential background required in some areas of practice.

*First, ME 500 is about 50 % thermodynamics and 50 % hydraulics. CEEG students already have a course in fluid dynamics (CE 413) and another course in applied hydraulics (CE 516), so ME 500 provides very little benefit to BSCE or BSEnE students.*

*In comment 3 below we indicate that we have increased the chemistry requirements in part by requiring two Physical Chemistry (Chem 521/522) courses. We believe that this 2-quarter physical chemistry sequence provides sufficient background in thermodynamics for practicing Environmental Engineers. Also, the sequence is focused on those aspects of thermodynamics most relevant to environmental engineering, namely chemical/biological thermodynamics rather than heat engines, and includes spectroscopy, which is the scientific basis of much analytical instrumentation.*

3. The Chemistry requirement appears insufficient. Here, the recommendations of the Department of Chemistry, communicated by Prof. John Parsons, should be addressed with a view toward ensuring there is an adequate background in chemistry to support professional practice.

*We accept the recommendations of the Department of Chemistry. We have increased the Chemistry requirement from two to four courses in the program and will now require Chem 221, Chem 231 and Chem 5201/521. We will now have one of the highest requirements for chemistry among environmental engineering programs.*

4. The BSEnE program requires at least 19 cr. hr. of technical electives selected from the list on pp. 113-114. In view of the typically *highly-structured* technical elective
lists in the BSCE program, some guidance for students should be provided for navigating the list on pp. 113-114.

First, the structure of the BSCE program is not relevant to the proposed BSEnE program, for the same reason that the structure of the BSME or BSCBE, etc. technical electives are not relevant.

Second, the proposed technical elective structure, listed below, adheres to the topics considered important by our accrediting and licensing agencies:

Fate and Transport in the Environment
CE 750 4 Seepage in Permeable Materials
CE 719 3 Water Quality Modeling
CE 723 4 Transport Phenomena in Water Resources Engineering
GEOL 651 5 Hydrogeology
GEOL 718 5 Geochemistry of Natural Waters
GEOL 719 5 Environmental Organic Geochemistry
SNR 675 3 Fate of Pollutants in Soils and Natural Water
SS 680 5 Soil Chemistry

Ecotoxicology, Public Health and Risk
CE 720 3 Environmental Engineering Risk Management
ENTOMOL 694 Ecological Risk Assessment
ENTOMOL 762 Environmental Toxicology and Chemistry
SNR 752 4 Environmental Science and Law

Management and Treatment of Wastes
CE 714 3 Hazardous Waste Management
CE 771 3 Radioactive Waste Management
CE 760 5 Civil and Environmental Engineering Planning
GEOL 717 5 Containment and Remediation of Contaminants in Ground Water

Ecological Engineering and Sustainability
CE 618 4 Ecological Engineering and Science
CE 722 4 River and Open Channel Hydraulics
ChBE 772 3 Principles of Sustainable Engineering
FABE 652 4 Ecosystems for Waste Treatment
ISWE 757 3 Industrial Ecology: Production Systems Perspective

Cross-cutting Courses
CE 693 1-5 Individual Studies
CE 694 1-5 Group Studies
CE H783 1-5 Honors Research
CE 798 1 Current Topics in Environmental Sc