Category I Transmittal Sheet

X Abbreviated _____Extended
X New Degrees
__ New Certificate Program
__ Establishment of New College or Department
__ Joint-Campus Programs
__ Establishment of New Center or Institute
X Reorganization of College, Department, Center, or Institute
__ Renaming a Degree, Certificate, or Administrative Unit
__ Elimination of a Major, Degree, or Certificate Program
__ Existing Degree Program Extended to New-Off-Campus Location

Title of Proposal

Creation of a School of Chemical, Biological, and Environmental Engineering
Establishment of M.S., MEng., and Ph.D. Degrees in Environmental Engineering
College of Engineering
Oregon State University

Proposing Department: Department of Chemical Engineering

CIP #: 14.1401

Date of Proposal: October, 2006

Proposed Effective Date: April, 2007

Kenneth Williamson
Department Head, ChE

10/17/06
Date

Ronald L. Adams
Dean, College of Engineering

10/19/06
Date
Oregon State University

A Category I Proposal to

Create a School of Chemical, Biological, And Environmental Engineering

CIP #: 14.0801, 14.0701

Name of Current Unit

Department of Chemical Engineering

Proposed Name of New Unit

School of Chemical, Biological, and Environmental Engineering

History

The Department of Chemical Engineering has a long history at OSU of being a small, high quality program with a strong emphasis upon providing a science-based curriculum with an emphasis upon chemical principles. Enrollments have typically been less than 200 students in the Department with a total faculty from 6 to 8. In 1999, the Bioengineering program was moved from the College of Agricultural Sciences to the Department which added about 100 students and 3 faculty. This integration resulted in increased collaboration in the Department in relation to sharing classes between the two programs and in various research areas.

The Environmental Engineering program within the Department of Civil Engineering started in the 1920s when Fred Merryfield returned as a faculty member in the Department. While “sanitary engineering” programs were rare at the time, OSU’s program had significant impacts including cleaning up the Willamette River, starting the Oregon State Sanitary Authority (predecessor of the present Oregon Department of Environmental quality), and founding of CH2M as one of the world’s largest engineering design firms. The program expanded greatly in the 1970 as the environmental movement grew in the US. The program has been active in research and graduate studies and added an accredited undergraduate degree in 1992. The program has been part of a consortium with Stanford University under funding for the EPA Western Region Hazardous Substance Research Center since 1989 at a level of over $1 million/yr and presently provides leadership to the Provost’s Initiative on the Subsurface Biosphere.

Based upon the success of the merger of chemical engineering and bioengineering, we are proposing to move the Environmental Engineering program from the Department of Civil, Construction, and Environmental Engineering to the Department of Chemical Engineering and to combine the three programs (Chemical Engineering, Bioengineering,
and Environmental Engineering) into a School of Chemical, Biological, and Environmental Engineering. The move of the Environmental Engineering program will require the establishment of M.S., MEng. and Ph.D. degrees in Environmental Engineering to replace their present practice of environmental engineering graduate students obtaining M.S., MEng., or Ph.D. degrees in Civil Engineering.

Reasons for Reorganization

Environmental engineering has historically been associated with physics-based civil engineering departments in the US. This connection resulted from the early need for the design of environmental engineering infrastructure such as sewerage, water distribution networks, and water and wastewater treatment facilities. From about 1980 to the present, almost all civil engineering departments in the US have expanded their names to something like “civil and environmental engineering” to provide recognition of environmental engineering programs and curricula within the respective departments.

From a pedagogical standpoint, however, chemical engineering, bioengineering, and environmental engineering share a traditional engineering foundation built with a heavy emphasis upon the physical, chemical, and biological sciences. We believe that modern curricula in environmental engineering need to shift to an approach to educate environmental engineers that can more fully embraces the new array of chemical and biological technologies. This is especially true for graduate students within environmental engineering and for undergraduate students who are planning to attend graduate school. While many universities offer undergraduate degrees in environmental engineering, the profession has long held the tradition that an M.S. degree was the entrance-level degree in environmental engineering.

The environmental engineering profession of the 21st Century will need to fully utilize the wide array of new technologies that are being introduced in the fields of biotechnology, nanotechnology, and modern chemical processing. Biotechnology applications presently range from DNA-array sensing of toxicity to the production of specialized enzymes from genetically-modified organisms. Nanotechnology advances now include improved water treatment methods to new membrane-embedded bio-catalysts. Modern chemical processing is rapidly adopting "green" chemistry, reductions of waste streams, and intelligent design of benign chemicals for use in society. Clearly, many other advanced technologies for the environmental engineering profession are on the horizon that will require higher-level scientific-based chemical and biological approaches that are presently not included within typical civil engineering departments.

This move to incorporate more chemical and biological engineering into environmental engineering is clearly reflected in the major project themes in the Biological and Environmental Systems (BES) Division of NSF. For example, the “Multiscale Modeling in Biomedical, Biological and Behavioral Systems” initiative of NSF will enable researchers to develop new molecular techniques for studying cellular and molecular processes in mixed bacterial communities. In this light, a current NSF-funded project
within the environmental engineering faculty is studying the gene expression of nitrifying bacteria upon exposure to toxic chemicals including heavy metals, chlorinated solvents, and aromatic compounds. By evaluating gene expression, the researchers will develop biosensors for monitoring wastewater treatment. Similar studies are being performed with anaerobic cultures that dehalogenate chlorinated solvents. A better understanding of complex microbial processes can now be obtained using these advanced molecular methods, which may lead to better remediation. Such approaches are far removed from traditional civil engineering paradigms.

Nanotechnology is also being applied to environmental systems including drinking water treatment, hazardous waste destruction, and environmental sensors and will require application of principles embedded in material science, chemistry, bioengineering, and chemical engineering. Collaboration of environmental engineering with these disciplines will be essential. Chemical engineering faculty are currently using microorganisms to fabricate nanoscale semi-conducting materials. This is being extended to the development of biogenetically-made titanium oxide photocatalysts for destruction of contaminants in drinking water and wastewater. Environmental engineering faculty are also involved in cross disciplinary research on the mathematical scaling of processes from the micro- to macro-scale, a topic embedded in chemical engineering traditions. Our ability to study processes at smaller spatial scales, then to model these processes at higher resolution will permit breakthroughs on the scaling of processes in systems such as reactive transport in porous media and reactions in biofilms. Researchers in environmental, chemical, and bioengineering at OSU are currently studying the scaling of diffusion processes in topics ranging from porous media to micro reactors to the human lung. Chemical engineering faculty also are engaged in environmental remediation research including bioremediation of explosives and polyaromatic hydrocarbons by marine organisms, and chemical reduction of chlorinated organics in micro-channel reactors. The chemical engineering discipline brings expertise in chemical kinetics and rate processes that can be shared with environmental engineering.

In addition to moving the Environmental Engineering program, we propose to create a School of Chemical, Biological, and Environmental Engineering (CBE) that will bring expertise in all three of these areas to common classes at both the undergraduate and graduate levels and to various collaborative research initiatives that would include creation of specific graduate degrees for the Environmental Engineering program. This change is aligned with the efforts within the College of Engineering to reduce the number of departments by consolidation into schools. The present Chemical Engineering Department has about 380 students (200 ChE undergraduates, 150 BIOE undergraduates, and 30 graduate students). The Environmental Engineering program has about 60 undergraduate students and 15 graduate students. In the future, there will be a concerted effort in the new School to expand the graduate programs in both chemical engineering and environmental engineering and the creation of the School will allow us to cost effectively provide more graduate courses especially at the Ph.D. level to support these increased enrollments.
Another reason for creation of the new School is to dramatically change the role of the Department Head from being internally focused to a more external role. The future vision for the College of Engineering at OSU is to be a major driver for technological innovation and economic growth in the state, which will require a new role for leadership in the College. As the Head of the School of Chemical, Biological, and Environmental Engineering, we see this individual as a leader in fund raising, technology transfer, strategic research planning, and meeting the educational needs of the state related to chemical processing, biotechnology and environmental services. To make this possible, the Head will need to delegate much of the internal operations to his/her Assistant Heads. Such delegation is not possible with the present Department administrative structure.

This proposed merger will allow greater collaborative teaching and research in the chemical engineering, bioengineering, and environmental engineering programs. Research for the School will be organized and administered through ONAMI and the Biological and Environmental Systems research clusters within the College and through the five research thrust areas presently in the Department (Micro-electronic Processing, Biological Processing, Micro-Reactors, Biomaterials, and Environmental Systems). By having a School with collaboration among faculty around chemical, biological, and environmental systems, our research and educational programs will have significantly higher visibility both internally and externally. We believe this proposed merger will enhance our ability to recruit top faculty in emerging fields and will assist with fund raising from industry and alumni, and that our strengths through collaboration will help COE to more rapidly achieve its goal of becoming a top 25 engineering program in the nation.

Organizational Charts (before and after)

The organization of the present Department of Chemical Engineering has two programs of chemical engineering and bioengineering as shown in Figure 1. The Department is presently administered by a Head and a staff of 3.5 FTE (office manager (0.5 FTE), accountant, office specialist, head advisor (0.5 FTE), and technician (0.5 FTE)); there are 13 faculty (Figure 2).

The organizational chart after merging into a School is shown in Figure 3 and the proposed staffing in Figure 4. The proposed School will have three programs with 18 faculty, 400 undergraduate students, and 45 graduate students sharing classes across these three disciplines (Figure 3) and will offer separate ABET-accredited B.S.degrees in Chemical Engineering and Bioengineering, and B.S. and B.A. degrees in Environmental Engineering. The School will be administered by a Head (0.5 FTE). The School Head will be responsible for a variety of activities including:

- Strategic planning for the School
- Fund raising
- Strategic research planning
- Administration with Office Manager
- Facilities and budget management
Scheduling, faculty workloads and faculty evaluations with the Assistant Heads

Promotion and tenure with Assistant Heads

With the new organization, we expect that the Head will spend more time on strategic
issues and building external relationships with industry and government agencies, fund
raising, and interacting with alumni. Many day-to-day administrative and curricula
duties will be handled by the Assistant Heads.

Each program will have an Assistant Head (about 0.15 FTE) with responsibilities for
administering the academic programs and assisting with faculty reviews. The
responsibilities of Assistant Head positions as shown may be consolidated into less than
three persons depending on the willingness of faculty to serve in these positions. Each
program will be responsible for providing information on courses to be offered, faculty
workloads, required GTAs, new course development, and graduation requirements for
their respective degrees. The Assistant Heads will be chosen by the faculty in that
program and will serve for three years terms.

Classified staff members will report to the Office Manager, as shown in Figure 4.

Environmental Engineering B.S./B.A. Degree

The environmental engineering curriculum will be altered to integrate coursework in the
chemical and biological sciences and utilize existing coursework and lab intensive
approaches in the chemical and bioengineering curricula. This integration has resulted in
reorganization of the chemical engineering and bioengineering curricula along with the
environmental engineering curriculum resulting in some 50 proposed Cat. II course
changes. The integration into common chemical engineering and bioengineering courses
is shown by specific courses that are required or elective to the environmental
engineering curriculum which include: two first-year “design-related” orientation
courses (ENVE 101, ENVE 102); three sophomore courses in stoichiometry and
conservation of mass and energy (ENVE 211 and 212) and process control (ENVE 213);
junior courses in momentum, heat and mass transfer (CHE 331, 332, and 333), chemical
thermodynamics (CHE 311 and CHE 312), and senior courses in instrumentation (CHE
417), bioreactors (BIOE 457), and chemical engineering laboratory (CHE 414) (see
Appendix 1).

Students desiring a more infrastructure emphasis in environmental engineering can
complete a B.S./B.A. degree in Civil Engineering with an environmental engineering
option. The option requires the student to take all the required ENVE courses required
for the proposed B.S./B.A. Environmental Engineering degree (ENVE 421, 422, 456,
425, and 431).

Environmental Engineering M.S. and MEng. Degrees

The M.S. and MEng. degrees in Environmental Engineering would follow the present
requirements for the degrees in Civil Engineering and Chemical Engineering as shown in
Appendix II. The M.S. degree would require an engineering thesis; the MEng. degree would require only coursework.

**Environmental Engineering Ph.D. Degree**

The Ph.D. degree in Environmental Engineering would follow the present requirements for the degrees in Civil Engineering and Chemical Engineering as shown in Appendix III.

**Personnel Changes**

The three new Assistant Program Heads will be drawn from existing faculty and will allow faculty to experience administrative duties without great impact upon their teaching and research activities.

**Support for Change**

The chemical engineering, bioengineering, and environmental engineering faculty strongly support the creation of the School. Support for the move of the Environmental Engineering program from the appropriate advisory boards are provided with the proposal. The School will internally give greater recognition within the College and externally will provide greater identity for the two programs.

**Impacts within the Unit**

Currently, the three programs offer several undergraduate and graduate degrees including:

- B.S. in Chemical Engineering
- B.S. in Bioengineering
- B.S./B.A. in Environmental Engineering
- M.S., MEng., and Ph.D. in Chemical Engineering

We are proposing to add graduate degrees (M.S., MEng., and PhD.) in Environmental Engineering to match the offerings in Chemical Engineering. Presently, bioengineering graduate students receive degrees in Chemical Engineering. In the future, we will propose new graduate degrees in Bioengineering (M.S., MEng., Ph.D.) that will be administered by the College of Engineering and would serve all the departments in the College including replacing the new degrees in Biological Engineering offered by the Department of Biological and Ecological Engineering (funded by the College of Agricultural Sciences).

We believe that the creation of a school will have several positive impacts including greater efficiency, expanded programs, and higher quality. Considerable effort will be placed upon integrating courses at both the undergraduate and graduate levels across the curriculum to provide more opportunities and larger classes.
The proposed merger will have an immediate and significant impact on research by the School. By consolidation, the School will support current research strengths in chemical engineering, bioengineering, and environmental engineering. We believe that the faculty in the new School will be able to fully integrate many aspects of chemical, environmental, and bioengineering practice, better serve our stakeholders, and expand their research opportunities especially in the area of biotechnology.

**Budget Impact**

The budget impact will be minimal as shown on the attached budget sheet. Support for the environmental faculty (4.5 FTE) will be moved to the Department of Chemical Engineering. Because the enrollment in environmental engineering is small compared to the enrollments in civil engineering and construction engineering management, all present staff will remain in the new proposed School of Civil and Construction Engineering. Incidentals, such as letterhead changes, signage, advertising, etc., will be minimal and will be covered by the existing budgets. The cost of administration (Head, Associate Head, and Assistant Heads) will remain approximately the same, but should provide greater efficiencies because of the involvement of a greater number of persons. The proposed change will allow greater fund raising and promotion of the research enterprise by the Head of the School.

**Adequate Staffing after Change**

By creating the proposed School of CBE, we will have more opportunities to provide an interdisciplinary education needed by students in chemical engineering, bioengineering, and environmental engineering. All student services for the three programs including advising, student organizations, internships, and job opportunities will be centralized in one location.

**Impact on Course Offerings**

The reorganization will have little impact initially on course offerings. However, the environmental engineering students will now be prepared to take a variety of chemical engineering and bioengineering courses that will improve the quality of the environmental engineering curriculum. The new School will effectively share more courses across the three programs resulting in larger undergraduate classes and increased cost effectiveness.

**Program Admission Requirements**

The reorganization will not impact program or admission requirements.
Impact on Advising

Advising will remain the same for the undergraduate and graduate degrees and will be administered by the Head Advisor for the undergraduate programs and the Chair of the Graduate Committee for the graduate students.

Impact on Educational Experience

The primary impact upon the educational experience will be an increased focus of the new School on interdisciplinary interaction of the three programs. During the 2005-06 academic year, we reorganized the curricula in chemical and environmental engineering and bioengineering to allow students more opportunities for courses covering topics in all three programs.

Impact on Current Accreditation

This reorganization will not impact accreditation. The Chemical Engineering, Environmental Engineering, and Bioengineering programs will continue to be accredited by the Accreditation Board of Engineering and Technology (ABET). Accreditation of the Bioengineering program was granted during fall, 2006. The appointment of three Assistant Heads to oversee accreditation activities will strengthen our abilities to meet accreditation requirements in the three programs.

Assessment

The new School will continue with the extensive assessment systems associated with accreditation by ABET. All three programs have extensive assessment programs in place to determine effectiveness in meeting program and learning outcomes through assessment tools including:

- Course assessment of learning objectives
- Exit interviews
- Alumni surveys
- Employer surveys
- Assessment by advising boards

Each program has an external advising board presently in place.

Resources Needed

No additional resources are required to create the School. Salary support and all pertinent scholarship funds and Foundation accounts associated with the environmental engineering program will be moved to the new School.
Relationship to the Institutional Mission

The College of Engineering is committed through its mission to provide teaching, research, service, and outreach as expected in a land-grant, Carnegie Class I institution to the people and industries of the State, the Pacific Northwest, the nation, and the world. The new School would continue to provide teaching, research, service, and outreach to meet the College and University goals. The new School will be unique in being the only School/Department in the US that offers chemical engineering, bioengineering, and environmental engineering in one program. We believe that the new School would provide a comprehensive, state-of-the-art education to prepare students for professional and responsible engineering positions with business, industry, consulting firms or government or to further pursue graduate education.

Long-range Goals

The long term goals for the School are to increase the number of faculty to about 30 with only a small increase in the number of undergraduate students. We plan to increase the graduate enrollment to about 100 students for a total enrollment of about 600 students in the School. A School related to chemical engineering, environmental engineering, and bioengineering with 600 students and 30 faculty would have adequate metrics to compare with Top 25 departments/schools in the US.

Relationship to other Program with COE

Oregon State University’s Biological and Ecological Engineering (BEE) Department (COE and CAS) offers academic programs that are synergistic with the programs offered by the proposed School. We recognize that there are opportunities for promoting collaboration and linkage between these programs. In particular, three areas have been identified as offering opportunity for collaboration: shared course offerings across curricula, recruitment of students, and coordination of ABET accreditation documentation. The proposed School and BEE are committed to working collaboratively to support strong linkages between the academic programs and to ensure consistency with accreditation needs and activities.

Relationship to other Institutions in the State

The merger should have minimal impact on other OSU units and/or constituencies. The School does not teach service courses for other departments and will continue its present graduate minors. OSU has the only undergraduate-degree-granting programs in Chemical Engineering, Bioengineering, and Environmental Engineering in the state.
Figure 1. Current Organizational Structure for the Department of Chemical Engineering

ChE: BS, MS, MEng, PhD
BioE: BS
Figure 2: Current Staffing of Chemical Engineering Department
Figure 3. Proposed Organizational Structure for the School of Chemical, Biological and Environmental Engineering

ChE: BS, MS, MEng, PhD
BioE: BS
ENVE: BS, BA, MS, MEng, PhD
Figure 4: Proposed Staffing of School of Chemical, Biological, and Environmental Engineering
(OUS and OSU)

**Category I Proposal Budget Outline**

Estimated Costs and Sources of Funds for the Proposed Program

Total new resources required to handle the increased workload, if any. If no new resources are required, the budgetary impact should be reported as zero.

See "Budget Outline Instructions" on the OUS Forms and Guidelines Web site: www.ous.edu/aca/aca-forms.html

**Institution:** Oregon State University  
**Category I Proposal Name:** Creation of a School of Chemical, Biological, and Environmental Engineering  
**Academic Year:** 2007-2008  
**Operating Year:** 1st  
**Completed by:** Ken Williamson  
*(indicate 1st, 2nd, 3rd, or 4th year--prepare one page for each)*

### Personnel

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<th>From Special State Appropriation Request</th>
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*OPE: Faculty  
Staff  
GTA/GRA  
Nonrecurring

**Personnel Subtotal:** 0 0 0 0 0 0 0 $0

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**Other Resources Subtotal:** 0 0 0 0 0 0 0 $0

### Physical Facilities

| Construction | $0 |
| Major Renovation | $0 |

**Physical Facilities Subtotal:** 0 0 0 0 $0

**GRAND TOTALS:** 0 0 0 0 0 0 0 $0

* See current OPE tables at http://oregonstate.edu/dept/budgets/budghand/tables.htm
Appendix 1. Proposed Environmental Engineering Undergraduate Curriculum

Proposed Requirements

ENVIRONMENTAL ENGINEERING (BA/BS) (192)

Freshman Year (46)

ENVE 101. Orientation (3)
ENVE 102. Introductory Chemical Engineering Computation (3)
CH 221. *General Chemistry (5)
CH 222. *General Chemistry (5)
CH 223. *General Chemistry (5)
COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
PH 211. *General Physics with Calculus (4)
WR 121. *English Composition (3)
Perspectives (3)

Sophomore Year (50)

CH 331, CH 332. Organic Chemistry (4,4)
ENVE 213. Process Analysis (4)
MB 230. General Microbiology (4)
MTH 256. Applied Differential Equations (4)
MTH 306. Matrix and Power Series Methods (4)
PH 212. *General Physics with Calculus (4)
PH 213. *General Physics with Calculus (4)
BIOE 211. Mass and Energy Balances (4)
ENGR 211. Statics (3)
ENGR 212. Dynamics (3)
ENGR 213. Strength of Materials (3)
WR 327. *Technical Writing (3)
HHS 241-HHS 251. *Lifetime Fitness: (various activities) (1)
HHS 231. *Lifetime Fitness for Health (2) or NFM 232. *Nutrition and Lifetime Fitness (2)
Junior Year: Track 1 (49)

CHE 321, 332. Transport I and II (4, 4)
CHE 333. Transport III (lab) (4)
CHE 311. Thermodynamic Properties and Relationships (3)
CHE 312. Chemical Engineering Thermodynamics (3)
CE 201. Civil Engineering II: Engineering Graphics and Design (3)
CE 313. Hydraulic Engineering (4)
ENVE 321. Environmental Engineering Fundamentals (3)
CHE 317. Instrumentation in Chemical, Biological and Environmental Engineering (4)
BI 370. Ecology (3)
CE 372. Soils Engineering (4)
Perspectives (6)
Free Elective (2)

Senior Year: Track 1 (47)

ENVE 421. Water and Wastewater Characterization (4)
BIOE 457. Bioreactors (3)
CHE 414. Chemical Engineering Lab (3)
ENVE 422. Water and Wastewater Engineering Design (4)
ENVE 431. Fate and Transport of Chemicals in Environmental Systems (4)
CE 412. Hydrology (3)
ENVE 456. Sustainable Water Resources Development (3)
ENVE 425. Air Pollution Control (3)
ENVE 490. Environmental Engineering Capstone Design (3)
Perspectives (6)
Synthesis (6)

Footnotes:
* = Baccalaureate Core Course
**WIC Course
E = Required for entry into the professional program
1 = Must be selected to satisfy the requirements of the baccalaureate core
Appendix 2. Proposed M.S. Degree in Environmental Engineering

MASTER’S DEGREE PROGRAM IN ENVIRONMENTAL ENGINEERING

1. Program Philosophy

M.S. Thesis Academic Requirements

The M.S. Thesis must have one or more of the following elements.

- Contribution to environmental engineering theory or practice
- Development of a new method for scientific or engineering investigation
- Generation of new scientific or engineering data that clearly contribute to the development of environmental engineering or sciences

M.S. Thesis vs. Project

An M.S. Thesis is required for all M.S. students.

1.3 Minimum Requirements for an M.S. Degree

The master’s degree program requires a minimum of 45 graduate credit hours, 36 credits of which are reserved for course work and 9 credits for the M.S. Thesis. However, the M.S. Thesis effort will reflect the requirements for the M.S. Thesis stated above, typically up to a year of research effort has been expended to complete the M.S. Thesis. Two-thirds of the work (30 credits including 9 credits for the Thesis) must be in the major field and one-third (15 credits) in the minor field. Credit hours used in one master’s program may not be used in an additional master’s program.

1.4 Residence Requirements

Thirty (30) graduate OSU credits after admission as a degree-seeking graduate student are required, which do not include credits reserved as an undergraduate or post-baccalaureate student nor credits taken as a post-baccalaureate or non-degree graduate student.

Unless on approved Leave of Absence, all graduate students in graduate programs must register continuously for a minimum of 3 graduate credits, excluding summer session, until their degree is granted.

1.5 Registration Requirements

Full-time status as a graduate student is defined by Oregon University System (OUS) as enrollment in 9 credits per term. GTA and GRA are required to register for a minimum of 12 credits each term of the appointment. Assistants whose appointments range between 0.15 and 0.29 FTE may register for a maximum of 15 credits per term. Those whose appointments range between 0.30 and 0.49 FTE may register for no more than 12 credits per term.
1.6 **Graduate Study Program**

A regular master’s degree student is required to find his/her Advisor Professor before the end of the first Fall term. The student must file a study program with the Graduate School before completing 18 hours of graduate credit. A student who does not file a program within the specified deadline will not be allowed to register for the next term.

1.7 **Time Limit**

All work toward a master’s degree must be completed within 7 years.

1.8 **Final Examination**

Successful completion of a final oral examination is required for all M.S. degrees. The examination committee is nominated by the student’s advisor, subject to the approval of School Head and the Graduate School.

**Thesis:** An examination copy of the master’s thesis must be presented to the Graduate School at least **one week prior to** the final oral examination. Additional examination copies of the thesis are distributed by the student at this time to other members of the examining committee, including the Graduate Council representative.

The examination committee consists of at least four members of the graduate faculty:

Two in the major field, including the student’s advisor,
One in the minor field, and
A Graduate Council representative.

It is the student’s responsibility to obtain his or her own Graduate Council representative from a list provided by the Graduate School.

The student must obtain written approval prior to scheduling the final oral examination. The final oral examination must be scheduled in the graduate School and also **must be announced in the Department of Chemical Engineering not less than one week prior to the date of the examination.**

The final examination should be scheduled for two hours. Not more than half of the examination period should be devoted to the presentation and defense of the thesis; the remaining time can be spent on questions relating to the student’s knowledge of the major and minor fields.

One dissenting vote is permitted. No more than one re-examination is permitted.

2. **Course Requirements**
2.1 Major Courses

The Environmental Engineering program offers the following core courses which must be taken for graduate credit for the major in Environmental Engineering.

- ENVE 531 (4) Fate and Transport of Chemicals in the Environment
- ENVE 532 (4) Aqueous Environmental Chemistry
- ENVE 534 (4) Physical and Chemical Processes for Water Quality Control
- ENVE 541 (4) Microbial Processes in Environmental Systems
- ENVE 535 (4) Physical and Chemical Processes for Hazardous Waste Treatment or
- ENVE 542 (4) Microbial Process Design for Municipal and Hazardous Wastes

Attendance in the CHE 507 Seminar is required for all the graduate students.

Exceptions to these courses and acceptance of substitute transfer courses will be handled on a case-by-case basis by the Graduate Committee.

2.2 Minor Courses

A graduate minor is an academic area that clearly supports the major. On a master’s program, a minor may be:

1. an academic area available only as a minor,
2. a different major,
3. the same major with a different area of concentration,
4. an approved major at another institution in the OUS,
5. an integrated minor.

An integrated minor consists of a series of cognate courses from two or more areas. These courses must be outside the major area of concentration. The graduate faculty member representing the integrated minor in the examination committee must be outside the department.

No more than 6 credits of blanket-numbered courses, other than thesis or project, may be applied toward the minimum-45-credit master’s degree.

3. Advisor

3.1 Advisor Selection

To file a graduate study program, a student must find a research advisor. During the fall term, all the faculty members in the School offer seminars to present their own research projects and interests. Also, needs of students for projects will be described in each presentation.
When a student finds research projects he/she is interested in, the student is required to see the Graduate Program Advisor before contacting any individual faculty members. The Graduate Program Advisor will contact the faculty members and ask if they are interested in seeing the student. When (and only when) they agree to meet with the student, the names of the faculty members who are going to see the student will be announced. At this time the student can call the faculty members to make appointments. This process will typically take place by the end of fall term.

The following process will also be used to place uncommitted, new graduate students who arrive in the winter, spring, or summer, i.e., out of sequence with the normal academic cycle. The Graduate Program Advisor will e-mail the faculty and ask if they are interested in seeing the student. The faculty will have one week to respond. The student must meet with all the faculty members who have expressed interests.

After meeting with the faculty members, the student must present to the Graduate Program Advisor a list of top three most preferred projects. The selection process will be finalized during a faculty meeting and the Graduate Program Advisor will send a letter to each student to inform him/her of the results of this process. The student must sign the “letter of intent” to work with the specific advisor. It is not allowed for any student to change his/her advisor after signing the letter, unless the student is placed under extraordinary circumstances. If a student needs to change his/her advisor because of funding reasons, the student must file a petition with the Graduate Program Committee. The Graduate Program Committee will make a decision on a case-by-case basis.

If a student fails in finding a research advisor, the student may seek for a research advisor outside the Environmental Engineering program. However, any research project offered in a different program must be approved by the graduate committee.

The Graduate Program Advisor is the advisor for all the new graduate students until they find their own research advisors. Whenever students have problems, they should refer all the problems to the Graduate Program Advisor.
Appendix 3. Proposed MEng. Degree in Environmental Engineering

MEng. DEGREE PROGRAM IN ENVIRONMENTAL ENGINEERING

Program Philosophy

A description of the College of Engineering MEng degree program is provided on http://engr.oregonstate.edu/news/story/1203.

1.1 MEng Thesis Requirements

The MEng degree in Environmental Engineering does not have a thesis or research requirement.

1.2 Minimum Academic Requirements for the MEng Degree

The MEng degree is intended for students who wish to pursue a “coursework only” terminal graduate degree in Environmental Engineering. The MEng degree program requires a minimum of 45 credit hours in graduate-level coursework. This includes 21 credits in the Major field, 15 credits in the Minor field, and 9 credits in an approved Engineering Emphasis area.

Any MEng degree student must earn a 3.00 GPA in courses required by their Graduate Study Program.

1.3 Residence Requirements

After admission, 30 OSU graduate credits as a degree-seeking graduate student are required in residence. This does not include credits reserved as an undergraduate or post-baccalaureate student or credits taken as a post-baccalaureate or non-degree graduate student.

Unless on approved Leave of Absence, all graduate students in graduate programs must register continuously for a minimum of 3 graduate credits, excluding summer session, until their degree is granted.

1.4 Registration Requirements

Full-time status as a graduate student is defined by Oregon University System (OUS) as enrollment in 9 credits per term.
1.5 Graduate Study Program

An MEng degree student is required file a study program with the Graduate School before completing 18 hours of graduate credit. A student who does not file a program after 18 credit hours are completed will not be allowed to register for the next term.

1.6 Time Limit

All work toward an MEng degree must be completed within 7 years.

1.7 Final Oral Examination

The student must obtain written approval prior to scheduling the final oral examination. The final oral examination must be scheduled through the Graduate School. The final examination should be scheduled for two hours, which will be spent on questions relating to the student’s knowledge of the Major, Minor, and Engineering Emphasis area fields. One dissenting vote is permitted for the MEng degree. No more than one re-examination is permitted.

2. Course Requirements

2.1 Major Courses (21 credits)

The Environmental Engineering program offers the following core courses which must be taken for graduate credit for the major in Environmental Engineering.

- ENVE 531 (4) Fate and Transport of Chemicals in the Environment
- ENVE 532 (4) Aqueous Environmental Chemistry
- ENVE 534 (4) Physical and Chemical Processes for Water Quality Control
- ENVE 541 (4) Microbial Processes in Environmental Systems
- ENVE 535 (4) Physical and Chemical Processes for Hazardous Waste Treatment or
- ENVE 542 (4) Microbial Process Design for Municipal and Hazardous Wastes

Attendance in the CHE 507 Seminar is required for all the graduate students.

Exceptions to these courses will be handled on a case-by-case basis.

2.2 Minor Courses (15 credits)

A graduate Minor is an academic area that clearly supports the major. For the MEng program, the Minor may be in the following:
(1) An academic area available only as a minor;
(2) A different major;
(3) The same major with a different area of concentration;
(4) An approved major at another institution in the OUS.

An Integrated Minor is not an option for the MEng degree candidate. Course selections for the Minor area must be approved by the student’s Committee.

2.3 Engineering Emphasis Courses (9 credits)

The Engineering Emphasis area consists of 9 credits of graduate-level coursework in engineering. This could include graduate-level elective courses within the College of Engineering. The Engineering Emphasis area should, as much as possible compliment the Minor. Course selections for the Engineering Emphasis area must be approved by the student’s Committee.

2.4 Transfer of Credits from MEng to MS or PhD Program

If a student enrolled in the environmental engineering MEng program later decides to pursue an MS or PhD degree, then credits obtained from MEng program can be moved to the MS degree or PhD degree program, subject to approval by the student’s MS or PhD Committee.

3. Advisor & Committee

3.1 Advisor Selection

The Graduate Program Advisor will serve as the advisor to all MEng degree candidates.

3.2 Committee Selection & Duties

The Committee will consist of at least four members of the graduate faculty: the Graduate Program Advisor, one additional faculty member in the major field, one faculty member in the Minor field, and a Graduate School faculty representative. It is the student’s responsibility to obtain his or her own Graduate School faculty representative from a list provided by the Graduate School.

The Committee will perform the following duties: 1) Review and approve the student’s Graduate Study Program for the MEng degree, including the student’s Minor field of coursework study and Engineering Emphasis area of coursework study; 2) participate in the Final Examination (see section 1.7).
Appendix 4. Proposed Ph.D. Degree in Environmental Engineering

Ph.D. DEGREE PROGRAM
Doctor of Philosophy in Environmental Engineering

1. General Requirements

The Doctor of Philosophy degree is granted primarily for a creative attainments. There is no rigid credit requirement; however, the equivalent of at least three years of full-time graduate work beyond the bachelor’s degree is required.

A Ph.D. degree student in the Environmental Engineering must include a minimum of 108 credits on his/her doctoral program. A minimum of one full-time academic year (at least 36 credits) should be devoted to the preparation of thesis. The equivalent of one full-time academic year of regular non-blanket course work (at least 36 credits) must be included on the doctoral program. However, it is up to the discretion of the Graduate Committee to require up to an additional 36 hrs of non-blanket course work as deemed necessary to support the Ph.D. research. No more than 15 credits of blanket-numbered courses, other than thesis, may be included in the minimum 108-credit program.

A Ph.D. degree student without an OSU M.S. degree in Environmental Engineering must complete the following courses or equivalents:

- ENVE 531 (4) Fate and Transport of Chemicals in the Environment
- ENVE 532 (4) Aqueous Environmental Chemistry
- ENVE 534 (4) Physical and Chemical Processes for Water Quality Control
- ENVE 541 (4) Microbial Processes in Environmental Systems
- ENVE 535 (4) Physical and Chemical Processes for Hazardous Waste Treatment or
- ENVE 542 (4) Microbial Process Design for Municipal and Hazardous Wastes

Coursework up to 3hrs deemed as necessary by the Doctoral Committee to support the chosen research area.

Attendance in CHE 507 - Seminar is required for all the graduate students.

Exceptions to these courses and acceptance of substitute coursework will be handled on a case-by-case basis by the Graduate Committee.

There are five steps to be completed towards a Ph.D. degree:

1. Approval of graduate study program
2. Written preliminary examination
3. Thesis proposal
4. Oral preliminary examination
5. Final oral examination
A thesis proposal meeting should be held with the student’s doctoral committee prior to the start of any substantial doctoral thesis research. However, this meeting may be held together with the oral preliminary examination, if it is considered appropriate.

2. **Graduate Study Program**

2.1 **Filing a study program with the Graduate School**

A regular graduate student who holds a master’s degree must file a study program with the Graduate School by the end of first academic year of enrollment as a doctoral student.

A regular graduate student who does not hold a master’s degree must file a study program with the Graduate School by the end of the fifth quarter of enrollment as a doctoral student.

A student who does not file a program within the specified deadline will not be allowed to register for the next term.

2.2 **Approval of the study program**

The student’s doctoral study program is formulated and approved subject to departmental policies at a formal meeting of his/her doctoral committee. The committee consists of a minimum of five members of the graduate faculty, including two (the advisor professor plus one more) from the major department and a representative of the Graduate School.

If a minor is declared, it must consist of at least 18 credits (15 credits for an integrated minor) and the committee must include a member from the minor department. All committee members must be on the graduate faculty with appropriate authorization to serve on the student’s committee.

A regular graduate student is encouraged to have his/her study program approved soon after sufficient information is obtained for the proposed research topic. Customarily, the student’s study program approval meeting is scheduled together with his/her thesis proposal meeting (see 6.1).

2.3 **Schedule of the study program meeting**

The study program meeting is scheduled in the Graduate School one week in advance. The student must be registered for a minimum of 3 credits for the term in which the program meeting is held. When the program is approved by the doctoral committee, the department head, and the dean of the Graduate School, it becomes the obligation of the student to complete the requirements as formulated. Changes in the program may be made by submitting a Petition for Change Form available in the Graduate School.

3. **Residence**

The residence requirement consists of two parts:

1. The students must spend at least three terms of full-time graduate academic work (at least 9 credits/term) on site at the Corvallis campus.
(2) A minimum of 36 graduate Oregon State University credits must be completed as a Ph.D. student. (The course credits for his/her Ph.D. thesis, which must be greater than 36, usually satisfies this requirement.)

Unless on approved Leave of Absence, all graduate students in graduate programs must register continuously for a minimum of 3 graduate credits, excluding summer session, until their degree is granted.

4. **Advisor Selection**

To file a graduate study program, a student must find a research advisor. The Graduate Committee within the School has will assist the student in finding an appropriate advisor.

5. **Preliminary Examination**

There are two preliminary examinations in the School of Chemical, Biological, and Environmental Engineering:

1. Written Preliminary Examination, and
2. Oral Preliminary Examination.

5.1 **Written Preliminary Examination**

A written examination must be completed prior to the oral preliminary examination.

**Eligibility**  Students who already have advanced degrees can take the examination after one term of residence in the ChE graduate program (typically in December). All other students must take the examination after three quarters (one year) of residence in the ChE graduate program (typically in June).

**Exam Content**  A short narrative description of a problem is given to students. Students are asked to analyze the problem and propose a solution to it in three weeks. The problem should reflect as much as possible characteristics of being real life, interdisciplinary, and open-ended. The details of the exam administration are administered by the Graduate Committee within the School.

5.2 **Oral Preliminary Examination**

The oral preliminary examination is taken near the completion of the student’s course work. The oral examination is conducted by the student’s doctoral committee, and should cover the student’s knowledge in his/her major and minor subjects. The examination may cover the student’s proposed research topic. However, no more than one-half the time should be devoted to specific aspects of the thesis project.

The examination will be scheduled for at least two hours, and the examination date must be scheduled in the Graduate School at least one week in advance. If more than one negative
vote is recorded by the examining committee, the candidate will have failed the oral examination. Only one re-examination is permitted.

At least one complete academic term must elapse between the time of the preliminary oral examination and the final oral examination. If more than five years elapse between these two examinations, the candidate must take another preliminary oral examination.

6. Thesis

Every candidate for the Ph.D. degree must submit a thesis embodying the results of research and giving evidence of originality and ability in independent investigation. The thesis must be a real contribution to knowledge, based on the candidate's own investigation, including one or more of the following elements:

- Contribution to theory
- Development of new method for scientific investigation
- Generation of new scientific data which clearly contribute to the development of sciences

The thesis must reflect a mastery of the literature of the subject and be written in creditable literature form. The preparation of an acceptable thesis will require at least one-full academic year.

6.1 Thesis Proposal Meeting

A formal thesis proposal meeting is required. This meeting should be held with the student's doctoral committee prior to the start of any substantial doctoral thesis research. It is advised that the thesis proposal meeting be held together with the meeting to approve the student's doctoral study program.

6.2 Regulations in the Graduate School

Regulations concerning the doctoral thesis are the same as those for the master's degree with the following exceptions:

(1) An examination copy of the thesis must be presented to the Graduate School at least two weeks prior to the final examination:
(2) Within six weeks of the final oral examination, two final copies of the thesis for the library and one extra copy of the abstract and title page must be deposited unbound in the Graduate School.

7. Final Oral Examination

After completion of or while concurrently registered for all work required by the program, the student must pass a final oral examination. The final oral examination must be scheduled in the Graduate School not less than two weeks prior to the date of the examination. The final oral examination must be announced not less than two weeks prior to the examination date.
The thesis defense portion of the final oral examination is open to all interested persons. After the open portion of the exam, the examining committee excludes all other persons and continues with the examination of the candidate’s knowledge of his or her field and the evaluation of the candidate’s performance. The oral final examination should be scheduled for at least two hours.

7.1 Examining Committee

The examining committee consists of the student’s doctoral committee and any additional members, including professors from other institutions, whom the Environmental Engineering program may recommend.

7.2 Re-examination

In the oral examination, the candidate is expected to defend the thesis and show a satisfactory knowledge of his or her field. If more than one negative vote is recorded by the examining committee, the candidate has failed the examination. Only one re-examination is permitted.

7.3 Timing

The final oral examination must be taken within five years after the oral preliminary examination. If more than five years elapse, the candidate is required to take another oral preliminary examination.

Liaison List

All Departments within COE
Department of Biological and Ecological Engineering
Department of Biochemistry
Department of Chemistry
College of Liberal Arts
College of Science
construction and business with a focus upon the construction of buildings. The proposed construction engineering program would focus on the combination of civil engineering and construction for those students with an interest in heavy civil applications (highways, bridges, dams, tunnels, etc.). These applications typically require greater emphasis upon civil engineering analysis and understanding of civil engineering materials (asphalt, steel, concrete, and aggregates). Such a program could be accredited under guidelines of the Accrediting Board of Engineering and Technology (ABET) just like the present civil engineering program. We would expect that this program would grow to about 150 undergraduate students (about half of the students would be from our present CEM program) and its graduates would serve large construction firms (Kiewit, Hoffman, etc.) and federal and state governmental agencies.

Relationship to other Institutions in the State:

The merger should have minimal impact on other OSU units and/or constituencies. The School does not teach service courses for other departments and would continue its present graduate minors, its undergraduate minor in Construction Engineering Management, and its dual degree with Forest Engineering. The other civil engineering programs in the state are located at Portland State University, the University of Portland, and Oregon Institute of Technology. OSU offers the only construction engineering management program in the State. There are no foreseen impacts of this proposal on these three programs.

Liaison List

All Departments within COE
Department of Forest Engineering
Department of Wood Science
College of Business
Graduate Program in Water Resources

Department of Civil and Environmental Engineering, Portland State University
Department of Civil Engineering, University of Portland
Department of Civil Engineering, Oregon Institute of Technology

Discussion of the responses obtained through liaison is included in Appendix 1.
Kenneth J. Williamson

From: Fiez, Terri [terri.fiez@oregonstate.edu]
Sent: Monday, July 17, 2006 8:50 AM
To: Williamson, Kenneth J.
Subject: RE: Category I for Creation of School of Chemical, Biological and Environmental Engineering

Ken,
Fine with me.
Terri

From: Kenneth J. Williamson [mailto:kenneth.williamson@oregonstate.edu]
Sent: Saturday, July 15, 2006 9:57 PM
To: Williamson, Kenneth J.; Fiez, Terri; Belinda.batton@oregonstate.edu; Reyes, Jose N; boltej@engr.orst.edu; Funk, Kenneth H II; McDaniel, Mina; Johnson, Becky - AcadAff; Schaffer, Kay; Bloomer, Sherman - COS; Ho, Pui Shing - ONID; Keszler, Douglas
Cc: Adams, Ronald Lynn; Lundy, James R; Bell, Chris A.
Subject: Category I for Creation of School of Chemical, Biological and Environmental Engineering

Subject: Abbreviated Category I for Creation of School of Chemical, Biological, and Environmental Engineering

DATE: July 15, 2006

FROM: Kenneth Williamson, Department Head, Department of Chemical Engineering

SUBJECT: Curriculum Liaison

The attached Category I proposal describes the creation of a School of Chemical, Biological, and Environmental Engineering within the College of Engineering.

In accordance with the liaison criteria in the Curricular Procedures Handbook, this memo serves as notification to your college/department of our intent to make this curricular change.

Please review the attached materials and send your comments, concern, or support to me by July 28. Your timely response is appreciated.

Please note that a lack of response will be interpreted as support.

Thank you for your time and input.

9/15/2006
Kenneth J. Williamson

From: Todd Palmer [palmerts@engr.orst.edu]
Sent: Sunday, October 15, 2006 9:37 PM
To: kenneth.williamson@oregonstate.edu
Cc: paasch@engr.orst.edu; James R. Lundy; levienk@engr.orst.edu; kimda@engr.orst.edu; Molly Shor; wayne.huber@orst.edu; john.sessions@oregonstate.edu; charles.brunner@oregonstate.edu; kevin.boston@oregonstate.edu; physics.chair@science.oregonstate.edu; budd@eecs.oregonstate.edu; Todd Palmer

Subject: Support of CBE and CCE Cat I proposals...

Ken,

The College of Engineering Curriculum Committee (COECC) has reviewed the abbreviated Cat I proposals for the creation of the Schools of Chemical, Biological and Environmental Engineering and Civil and Construction Engineering, and this email is documentation of our support.

Sincerely,

Todd Palmer
COECC Chair

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Todd S. Palmer
Associate Professor
Chair, Undergraduate Program
Department of Nuclear Engineering and Radiation Health Physics
Oregon State University
116 Radiation Center
Corvallis, OR 97331-5902
541-737-7064
palmerts@ne.orst.edu
March 25, 2005

Dr. Mina McDaniel
Director of Academic Programs
110A Kerr Administration Bldg.
Oregon State University
Corvallis, OR 97331

Dear Dr. McDaniel:

As Chair of the Environmental Engineering Advisory Board for the Department of Civil, Construction, and Environmental Engineering, I want to state that our Board unanimously supports the movement of the Environmental Engineering program from CCEE to the Department of Chemical Engineering. Our Board believes that this move will offer academic advantages for both undergraduate and graduate students and increased research possibilities to faculty and graduate students.

Sincerely,

[Signature]

Cc: Dr. Kenneth Williamson
March 28, 2005

Dr. Mina McDaniel, Asst. Provost
Administration
Oregon State University
Corvallis, Oregon 97331-2208

Dear Dr. McDaniel:

As Chair of the Civil, Construction and Environmental Engineering Advisory Board, I want to state that our Board unanimously supports the movement of the Environmental Engineering program from the CCEE to the Department of Chemical Engineering. We believe that the development of the environmental engineering profession has resulted in environmental engineering being more closely aligned with the Chemical Engineering curriculum. We are requesting that the present possibilities for civil engineering students to obtain either options or minors in environmental engineering be retained and clearly identified in the CCEE advising guides.

Sincerely,

W&H PACIFIC

[Signature]

William M. Jabs, P.E.

CC: Ken Williamson
October 20, 2006

Kenneth Williamson  
Professor and Head  
Department of Chemical Engineering  
Oregon State University  
102 Gleeson Hall  
Corvallis, Oregon 97331

Dear Ken,

As Chair of the Chemical Engineering Industrial Advisory Board, I wish to state the Board's support for the move of the environmental engineering program to the Department and the creation of a new School of Chemical, Biological, and Environmental Engineering. The Board clearly sees the synergistic relations between the environmental engineering program and the existing chemical engineering/bioengineering programs. We look forward to the benefits that should occur from a larger faculty and the potential interdisciplinary interactions with the new School of Chemical, Biological, and Environmental Engineering.

Best Regards,

Dan Parquet  
Merix Corporation  
Chair, ChE Industrial Advisory Board  
Dan.parquet@merix.com
Dear Ken,

We have no objections to the proposal.

Ken

--

Kenneth H. Funk II, PhD
Associate Department Head
Industrial & Manufacturing Engineering
Oregon State University
Corvallis, Oregon, USA 97331-2407
1-541-737-2357 funkk@engr.orst.edu http://www.engr.orst.edu/-funkk
October 17, 2006

Mina McDaniel  
Director of Academic Programs and Academic Assessment  
110 Kerr Administration Building  
Campus

Dear Mina:

We are requesting approval of the attached proposal for the “Creation of a School of Chemical, Biological, and Environmental Engineering.” The liaison responses are attached and all responses to the liaison were positive.

Please contact us directly if you need any additional information.

Sincerely,

Kenneth J. Williamson  
Professor and Head

Ronald L. Adams  
Dean