Environmental Engineering (EVEN) Degree Guidelines

Academic Year 2003-2004

College of Engineering and Applied Science

University of Colorado at Boulder

Environmental Engineering Program

428 UCB (U.S. Mail)

1111 Engineering Drive, Engineering Center OT 511 (street address)

University of Colorado

Boulder, Colorado 80309-0428

phone: 303 735 0253

fax: 303 735 1485

web: http://www.colorado.edu/engineering/even/

Environmental Engineering Program Staff

Director: Professor Joseph Ryan, ECOT 517, 303 492 0772, joseph.ryan@colorado.edu

Program Coordinator: Joan Hemm, ECOT 511, 303 735 0253, joan.hemm@colorado.edu

Version: Fall Semester 2003

Contents

1. Introduction to Environmental Engineering

The *Environmental Engineering Degree Guidelines* provide an outline of the curriculum and policies of the Environmental Engineering (EVEN) degrees offered by the College of Engineering and Applied Science of the University of Colorado at Boulder. These guidelines are written primarily for the Environmental Engineering students and faculty advisors.

General curriculum and policy information for students is also available from the Office of Student Services in the Dean's Office of the College of Engineering and Applied Science. Similar information on academic support programs, advising, and registration is available on the web at the College's Undergraduate Student Services web page (http://www.colorado.edu/engineering/ss_undergrad.html).

Information on courses offered each semester is available in the *Registration Handbook and Schedule of Courses* and the *University of Colorado at Boulder Catalog* published by the University of Colorado. Course scheduling information is available on University's Schedule Planner web page (http://plus.colorado.edu/plus/planner/). Current course catalog information is available at (http://www.colorado.edu/sacs/currentcatalog/).

1.1. Overview of Environmental Engineering

Environmental engineers play a vital role in maintaining the quality of both human environmental systems and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere, land, water, and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations. These issues include safe drinking water, wastewater processing, solid and hazardous waste disposal, outdoor air pollution, indoor air pollution and transfer of infectious diseases, human health and ecological risk management, and prevention of pollution through product or process design.

To address these challenges, environmental engineers often encounter challenging problems that must be solved in data-poor situations as members of multidisciplinary teams. Environmental problems require creative solutions blended with contributions from scientists, lawyers, business people, and the public. Good communication skills, as well as technical proficiency, are essential for success in this arena. In addition, technology designed to address environmental problems is marketed globally, opening up increasing opportunities for international work in the environmental engineering field.

1.2. History of the Environmental Engineering Program

The Environmental Engineering Program at the University of Colorado at Boulder originated with a college-wide faculty committee that met during the 1993-1994 academic year to develop a multi-disciplinary curriculum for a Bachelor of Science degree in Environmental Engineering. The committee was headed by Prof. John Daily of Mechanical Engineering. The degree program was intended to supplement environmental engineering options that were offered through the Departments of Chemical and Biological Engineering and Civil, Environmental, and Architectural Engineering (the Department of Mechanical Engineering now offers an environmental engineering option as well).

The initiative to develop the EVEN BS degree and the Environmental Engineering Program to administer the degree was motivated by recognition that (1) environmental engineering had matured into a full-fledged discipline of its own and (2) environmental engineering intersected with the traditional disciplines of chemical, civil, and mechanical engineering, but was not adequately covered by any single discipline. The faculty committee decided that students intending to work in environmental engineering would benefit from a curriculum that focused on environmental engineering and related courses regardless of which department offered those courses. At the same time, the existing environmental engineering options could be retained in the Departments for students who were interested in environmental engineering but wanted to pursue traditional Chemical, Civil, or Mechanical engineering degrees.

The proposed EVEN BS degree program was approved by the faculty of the College of Engineering and Applied Science in the spring of 1994. The faculty committee then prepared a full proposal for the new degree program for the Colorado Commission on Higher Education (CCHE), and the new EVEN BS degree program was approved in the spring of 1998. The first Director of the Environmental Engineering Program was Prof. Jana Milford of Mechanical Engineering. Students began entering the program in the fall of 1998. The first degree was awarded in December 1999 (to a student who transferred into the program as a junior).

In approving the new degree, CCHE relied on the College's intent to deliver the EVEN BS degree using existing courses and faculty. To this end, the program is administered by the College, and operates through the participation of

affiliated faculty from Aerospace Engineering Sciences, Chemical and Biological Engineering, Civil, Environmental and Architectural Engineering, and Mechanical Engineering. The College provides support for a faculty Director (currently Prof. Joseph Ryan of Civil, Environmental, and Architectural Engineering), a Program Coordinator (Joan Hemm), and adjunct instructor and teaching assistant support for field course to supplement the EVEN curriculum (EVEN 4830 Environmental Sampling and CVEN 3434 Aquatic Ecology). The four departments that participate in the program are committed to regularly offering the courses that comprise the EVEN curriculum, coordinating to avoid scheduling conflicts, and sharing academic advising and other faculty service requirements.

During the 2002-2003 academic year, the Environmental Engineering Program applied for accreditation of the EVEN BS degree with the Accreditation Board of Engineering and Technology (ABET). The application consisted of a detailed Self-Study Report and a visit by three ABET examiners. The ABET examiners were thoroughly satisfied with the EVEN BS degree and final approval of the accreditation application is due in September 2003.

1.3. Educational Objectives

The educational objectives of the Environmental Engineering Bachelor of Science degree are to

1. Provide a curriculum that imparts proficiency in the sciences, mathematics, and engineering disciplines needed to pursue a professional career or advanced degrees in environmental engineering.
2. Emphasize to our students the importance of the design process, team work, and communication in environmental engineering education, research, and practice.
3. Furnish our students with ample computer, laboratory, and field learning experiences to reinforce engineering concepts and provide skills useful for employment and advanced learning.
4. Encourage our students to engage in a coordinated exposure to a set of arts and humanities courses that complement their environmental engineering education.
5. Integrate research into our curriculum to develop independent work and communication skills in our students.
6. Recognize and respond to the changing nature of the preparation required for a professional career or advanced degrees in environmental engineering in our curriculum offerings.
7. Prepare students to cope with the unique challenges and ambiguities of environmental problems, which typically require multidisciplinary approaches in data-poor situations with competing technical, economic, and social goals in an ethical manner.
8. Instill in our students a responsibility to serve the needs of our society and protect the future of our planet in an ethical manner.
9. Inspire value of education and life-long learning in our students.
10. Provide students with direct contact with the faculty through advising and participation in research projects.

2. Environmental Engineering Degree Programs

2.1. Bachelor Science Degree in Environmental Engineering

2.1.1. Overview of EVEN BS Degree

The Bachelors of Science degree in Environmental Engineering (EVEN) at the University of Colorado provides preparation for professional proficiency or graduate training in environmental engineering in a four-year curriculum.

The curriculum includes courses in engineering fundamentals and applications, advanced mathematics, chemistry, physics, biology, and geology, and the arts and humanities. In common with other fields of engineering, courses in solid mechanics, fluid dynamics, and thermal sciences are at the core of the Environmental Engineering Bachelor of Science degree. Courses specific to environmental engineering practice include water and wastewater treatment, hazardous waste storage and treatment, and air pollution control. In addition, environmental engineering requires hands-on laboratory experiences, up-to-date skills in the use of computers for modeling and data analysis, and experience in the design of environmental engineering systems. Many of the required engineering courses in the Bachelor of Science curriculum are culled from Aerospace Engineering Sciences, Chemical and Biological Engineering, Civil, Environmental and Architectural Engineering, and Mechanical Engineering.

The curriculum also includes four Option courses and three technical elective courses. The four Option courses represent an area of specialization in environmental engineering selected by the student beginning in the junior year. The curriculum includes four sets of Options courses representing specialization in

- Air Quality
- Applied Ecology
- Chemical Processing
- Water and Wastewater

Students may also formulate their own sequence of Option courses representing an area of specialization not included in the list above; this selection must be done by petition to the Environmental Engineering Program. Students in the program are also encouraged to participate in research through independent study projects, the Undergraduate Research Opportunities Program (UROP), or as undergraduate research assistants in sponsored research programs.

2.1.2. Curriculum for EVEN BS Degree

The following section contains the curriculum table for EVEN BS degree. The curriculum represents "contract" of sorts with incoming students – for students entering the program during the current academic year, completion of this curriculum with a satisfactory grade point average is the requirement for graduation. The curriculum also represents a guarantee that the courses listed (or acceptable substitutes) will be available in the semesters listed.

The curriculum is somewhat dynamic, despite its contractual nature. Minor changes may be made during the academic year. Major changes may be made between academic years. To meet graduation requirements, students are expected to follow the curriculum in effect for the academic year they started the program; therefore, students should keep a copy of the *Degree Guidelines* for the academic year they start the program. In some cases, students may elect to follow a later curriculum revision with Program approval; however, students may not elect to follow a curriculum in effect before they started the program.

The curriculum below shows the recommended sequence of courses. In each curricula, courses marked with an asterisk (*) are offered only in the semester shown. Other courses are offered in both semesters. The scheduling of courses marked by a cross (†) is not limited by the timing shown in the curricula. For example, the required course in Probability and Statistics (junior fall in the EVEN BS curriculum) may be taken in another semester (provided that all prerequisite and co-requisite course requirements are met) because Probability and Statistics is not required by a course following it in the curriculum schedule.

Many required courses in the EVEN BS curriculum offer a set of courses from different engineering departments as choices (Solid Mechanics, Fluid Mechanics, Thermodynamics, Heat Transfer, Probability and Statistics, and Numerical Methods). Students may choose any of the offerings from different departments for these required courses; however, students should evaluate these choices carefully depending on their major interest in environmental engineering. For example, a student interested in the Air Quality Option would do best to choose the Mechanical Engineering courses for Solid Mechanics, Fluid Mechanics, Thermodynamics, and Heat Transfer. A student interested in the Chemical Processing Option would do best to choose Chemical Engineering courses (in fact, CHEN 3320 Chemical Engineering Thermodynamics is required for some of the Chemical Processing Option courses). The number of these required courses with choices among department offerings is greatly reduced in the dual EVEN/CHEN BS and EVEN/CVEN BS

degree curricula because courses from CHEN or CVEN are required to fulfill graduation requirements in the second BS degree.

For certain courses in the EVEN BS degree curricula, students may encounter problems and concerns about prerequisite and co-requisite course requirements not being met. There is no need for concern; the Environmental Engineering Program has consulted in detail with the departments and faculty offering these courses and has gained assurance that the sequence of courses in the EVEN curricula is appropriate for engineering students. For example, CHEM 4511 Physical Chemistry 1 lists CHEM 3311 Organic Chemistry 1 as a prerequisite in the University of Colorado *Course Catalog*, but the Department of Chemistry and Biochemistry has approved the EVEN course sequence.

Guidance on selection of Option courses, Humanities and Social Science (H&SS) courses, and technical elective courses is offered in Section 4.

EVEN BS Degree, 2003-2004 Academic Year

Freshman, Fall	**16**	**Freshman, Spring**	**17**
APPM 1350 Calculus 1 for Engineers	4	APPM 1360 Calculus 2 for Engineers	4
CHEM 1211 General Chemistry for Engineers	3	GEEN 1400 Engineering Projects	3
CHEN 1221 General Chemistry Laboratory	2	PHYS 1110 General Physics 1	4
*EVEN 1000 1st Year Seminar in Environmental Engr	1	H&SS Elective II	3
*GEEN 1300 Intro to Engineering Computing	3	Technical Elective I[b]	3
H&SS Elective I[a]	3		
Sophomore, Fall	**15**	**Sophomore, Spring**	**16**
APPM 2350 Calculus 3 for Engineers	4	APPM 2360 Intro Differential Eqns & Linear Algebra	4
*CHEN 2120 Chem Engr Material and Energy Balances	3	CHEM 4511 Physical Chemistry 1 (engr section)	3
PHYS 1120 General Physics 2	4	CVEN 3414 Introduction to Environmental Engr	3
PHYS 1140 Experimental Physics 2	1	Solid Mechanics[c]	3
H&SS Elective III	3	H&SS Elective IV	3
Junior, Fall	**17**	**Junior, Spring**	**17**
CHEM 3311 Organic Chemistry 1	4	*CHEN 3220 Chem Engr Separatn & Mass Transfer	3
CHEM 3321 Laboratory in Organic Chemistry 1	1	*CVEN 3454 Water Chemistry	4
Fluid Mechanics[e]	3	Heat Transfer[h]	3
†Probability & Statistics[d]	3	†Option Course I[i]	3
Thermodynamics[f]	3	HS&S Elective V	3
Required Communication Course[g]	3	Free Elective[j]	1
Senior, Fall	**15**	**Senior, Spring**	**15**
*CVEN 4434 Environ Engineering Design	3	*CVEN 4333 Engineering Hydrology	3
*CVEN 4484 Environmental Microbiology	3	*MCEN 4131 Air Pollution Control	3
†Numerical Methods[k]	3	†Option Course III	3
†Option Course II	3	†Option Course IV	3
†Technical Elective II	3	†Technical Elective III	3
		Total Credit Hours	**128**

*only offered in the semester shown.

†course is required but sequencing is flexible.

[a]a total of 18 credit hours of humanities and social sciences (H&SS) electives is required. At least six hours must be at the upper division (3000 or 4000) level. Required Communication Course must be taken at the 3000-level or above.

[b]the first technical elective course may be a lower division environmental science elective. The remaining technical elective courses should be courses at the 3000+ level in engineering, mathematics, or sciences.

[c]Solid Mechanics options: CVEN 2121 Analytical Mechanics (S&F), MCEN 2023 Statics and Structures (F).

[d]Probability and Statistics options: CHEN 3010 Applied Data Analysis (F), CVEN 3227 Probability, Statistics, and Decisions (S).

[e]Fluid Mechanics options: CHEN 3200 Chemical Engineering Fluid Mechanics (S), CVEN 3313 Theoretical Fluid Mechanics (S & F), MCEN 3021 Fluid Mechanics (F).

[f]Thermodynamics options: CHEN 3320 Chemical Engineering Thermodynamics (F), *required for Chemical Processing Option*; MCEN 3012 Thermodynamics, *required for Air Quality Option*.

[g] Usually WRTG 3030 or HUEN 3100 Humanities for Engineers 1 and HUEN 3200 Humanities for Engineers 2.

[h]Heat Transfer options: CHEN 3210 Chemical Engineering Heat Transfer (F), MCEN 3022 Heat Transfer (S).

[i]Option courses are specified below.

[j]Free elective: This one credit may be used for a H&SS or technical elective or for an Option course.

[k]Numerical Methods: CHEN 4580 Numerical Methods for Process Simulation (F), MCEN 4030 Computational Methods (S)

Beginning in the spring of their junior year, students must select an Option, an area of specialization in environmental engineering. For each option, a total of 12 credit hours of option courses are required. Students may choose from the lists of possible Option courses listed below.

Air Quality Option

- ATOC 3500 Air Chemistry and Pollution (3 credit hours, F)
- ATOC 4710 Atmospheric Physics (3 credit hours, F)
- CHEM 4541 Physical Chemistry Laboratory (2 credit hours, S)
- MCEN 3042 Thermal Systems Design (3 credit hours, S)
- MCEN 4141 Indoor Air Pollution (3 credit hours, F)
- MCEN 4152 Introduction to Combustion (3 credit hours, F)
- MCEN 4162 Energy Conversion (3 credit hours, check with Mechanical Engineering Department)
- EVEN 4830 Special Topics -- Environmental Satellite Remote Sensing (3 credit hours, F)

Applied Ecology Option

- CVEN 3434 Intro to Applied Ecology (*required for this option*, 3 credit hours, *every other* S)
- EPOB 2070 Genetics: Molecules to Populations (4 credit hours, F) *or*
  EPOB 2080 Evolutionary Biology (4 credit hours, S)
- EPOB 3040 Conservation Biology (3 credit hours, F)
- EPOB 3270 Ecosystem Ecology (3 credit hours, S)
- EPOB 4030 Limnology (3 credit hours, S)
- EVEN 4830 Special Topics – Environmental Satellite Remote Sensing (3 credit hours, F)

Chemical Processing Option

- CHEM 3331 Organic Chemistry 2 (3 credit hours, F)
- CHEN 3130 Chemical Engineering Laboratory 1 (2 credit hours, S)
- CHEN 4130 Chemical Engineering Laboratory 2 (2 credit hours, F)
- CHEN 4330 Chemical Engineering Reaction Kinetics *(required for this option, junior year,* 3 credit hours, S)
- CHEN 4670 Environmental Separations (3 credit hours, every other F)
- CHEN 4680 Environmental Process Engineering (3 credit hours, every other F)

Water and Wastewater Option

- CVEN 3323 Hydraulic Engineering (3 credit hours, F)
- CVEN 3424 Water and Waste Water Treatment (3 credit hours, S)
- CVEN 4424 Aquatic Organic Contaminants (3 credit hours, F)
- CVEN 4474 Hazardous and Industrial Waste Management (3 credit hours, S)
- CVEN 4353 Groundwater Engineering (3 credit hours, F)
- CVEN 4423 Water Resources Engineering Design (3 credit hours, S)

Special Option

Students with unique educational goals may formulate a personalized sequence of four courses (12 credit hours) as the Option sequence. To do so, students must present their Option plan to their faculty advisor and submit a petition to the Environmental Engineering Program for approval. The Special Option petition course may be found in the Forms Appendix.

2.2. Dual Bachelor of Science Degrees

The Environmental Engineering Program has set up two dual degrees to be completed in four and one-half years, one with Chemical Engineering and one with Civil Engineering.

2.2.1. Environmental Engineering/Chemical Engineering Dual Bachelor of Science Degrees

The Environmental Engineering Program is cooperating with the Chemical and Biological Engineering (CHEN) Department to offer dual EVEN BS/CHEN BS degrees in a four and one-half year curriculum. The curriculum provides the two degrees by closely following the Environmental Engineering degree with the Chemical Processing Option and adding key fundamental courses in the Chemical Engineering Bachelor of Science curriculum.

Students pursuing the EVEN BS/CHEN BS dual degrees are encouraged to seek advice from one of the Chemical and Biological Engineering faculty participating in the Environmental Engineering Program (see Section 6). There are no special qualification requirements, other than satisfactory progress toward both degrees, for pursuing the dual EVEN BS/CHEN BS degrees.

The EVEN BS/CHEN BS dual degree curriculum is presented on the following page. The Degree Worksheet is available in the Appendix.

2.2.2. Environmental Engineering/Civil Engineering Dual Bachelor of Science Degrees

The Environmental Engineering Program is cooperating with the Civil, Environmental, and Architectural Engineering Department to offer dual EVEN BS/Civil Engineering (CVEN) BS in a four and one-half year curriculum. The curriculum closely follows the Environmental Engineering degree with the Water and Wastewater Option. Key fundamental courses in the Civil Engineering and the Environmental and Water Resources track in Civil Engineering are added.

Students pursuing the EVEN BS/CVEN BS dual degrees are encouraged to seek advice from one of the Civil, Environmental, and Architectural Engineering faculty participating in the Environmental Engineering Program (see Section 6). There are no special qualification requirements, other than satisfactory progress toward both degrees, for pursuing the dual EVEN BS/CVEN BS degrees.

The EVEN BS/CVEN BS dual degree curriculum is presented two pages ahead. The Degree Worksheet is available in the Appendix.

Dual EVEN/CHEN BS Degrees Curriculum, 2003-2004 Academic Year

Freshman, Fall	**16**	**Freshman, Spring**	**15**
APPM 1350 Calculus 1 for Engineers	4	APPM 1360 Calculus 2 for Engineers	4
CHEM 1211 General Chemistry for Engineers	3	CHEN 1300 Introduction to Chemical Engineering	1
CHEN 1221 General Chemistry Laboratory	2	GEEN 1400 Engineering Projects	3
*EVEN 1000 1st Year Seminar in Environmental Engr	1	PHYS 1110 General Physics 1	4
*GEEN 1300 Intro to Engineering Computing	3	H&SS Elective II	3
H&SS Elective I[a]	3		
Sophomore, Fall	**17**	**Sophomore, Spring**	**17**
APPM 2350 Calculus 3 for Engineers	4	APPM 2360 Intro Differential Eqns & Linear Algebra	4
CHEM 3311 Organic Chemistry 1	4	CHEM 3331 Organic Chemistry 2	4
CHEM 3321 Laboratory in Organic Chemistry 1	1	CHEM 3341 Laboratory in Organic Chemistry 2	1
*CHEN 2120 Chem Engr Material and Energy Balances	3	CHEM 4511 Physical Chemistry 1	3
PHYS 1120 General Physics 2	4	CHEM 4541 Laboratory in Physical Chemistry 1	2
PHYS 1140 Experimental Physics 2	1	*CHEN 3200 Chemical Engineering Fluid Mechanics	3
Junior, Fall	**15**	**Junior, Spring**	**15**
*CHEN 3010 Applied Data Analysis	3	CHEN 3130 Chemical Engineering Laboratory 1	2
CHEN 3210 Chemical Engineering Heat Transfer	3	*CHEN 3220 Chem Engr Separations & Mass Transfer	3
*CHEN 3320 Chemical Engineering Thermodynamics	3	*CHEN 4330 Chemical Engineering Reaction Kinetics	3
CVEN 3414 Introduction to Environmental Engineering	3	*CVEN 3454 Water Chemistry	4
Required Communication Course[b]	3	H&SS Elective III	3
Senior, Fall	**15**	**Senior, Spring**	**18**
CHEN 4090 Undergraduate Seminar	1	*CHEN 4440 Chemical Engineering Materials	3
*CHEN 4130 Chemical Engineering Laboratory 2	2	*CHEN 4530 Design Project	2
*CHEN 4520 Chemical Process Synthesis	3	*CHEN 4570 Instrumentation and Process Control	4
*CHEN 4580 Numerical Methods for Process Simulation	3	*CHEN 4670 Environmental Separations *or* *CHEN 4680 Environmental Process Engineering	3
H&SS Elective IV	3	*CVEN 4333 Engineering Hydrology	3
Solid Mechanics[c]	3	*MCEN 4131 Air Pollution Control	3
Fifth Year, Fall	**15**		
*CVEN 4434 Environmental Engineering Design	3		
*CVEN 4484 Environmental Microbiology	3		
Chemistry Elective[d]	3		
Technical Elective[e]	3		
H&SS Elective V	3		

Total Credit Hours 143

*only offered in the semester shown.

[a]a total of 18 credit hours of humanities and social sciences (H&SS) electives is required. At least six hours must be at the upper division (3000 or 4000) level. Required Communication Course must be taken at the 3000-level or above.

[b]Usually WRTG 3030 or HUEN 3100 Humanities for Engineers 1 and HUEN 3200 Humanities for Engineers 2.

[c]Solid Mechanics options: CVEN 2121 Analytical Mechanics (S&F), MCEN 2023 Statics and Structures (F).

[d]Chemistry elective: must be taken at the 3000 level or above in Chemistry and Biochemistry (CHEM).

[e]Technical elective: must be taken at the 3000 level or above.

Dual EVEN/CVEN BS Degrees Curriculum, 2003-2004 Academic Year

Freshman, Fall	**16**	**Freshman, Spring**	**17**
APPM 1350 Calculus 1 for Engineers	4	APPM 1360 Calculus 2 for Engineers	4
CHEM 1211 General Chemistry for Engineers	3	CVEN 1317 Introduction to Civil Engineering	1
CHEN 1221 General Chemistry Laboratory	2	CVEN 2012 Plane Surveying	2
*EVEN 1000 1st Year Seminar in Environmental Engr	1	CVEN 3698 Engineering Geology	3
*GEEN 1300 Intro to Engineering Computing	3	PHYS 1110 General Physics 1	4
H&SS Elective I[a]	3	H&SS Elective II	3
Sophomore, Fall	**17**	**Sophomore, Spring**	**16**
APPM 2350 Calculus 3 for Engineers	4	APPM 2360 Intro Differential Eqns & Linear Algebra	4
AREN 1017 Engineering Drawing	2	CVEN 3161 Mechanics of Materials 1	3
*CHEN 2120 Chem Engr Material and Energy Balances	3	CVEN 3313 Theoretical Fluid Mechanics	3
CVEN 2121 Analytical Mechanics 1	3	CVEN 3414 Intro to Environmental Engineering	3
PHYS 1120 General Physics 2	4	H&SS Elective III	3
PHYS 1140 Experimental Physics 2	1		
Junior, Fall	**15**	**Junior, Spring**	**16**
CHEM 3311 Organic Chemistry 1	4	CHEM 4511 Physical Chemistry 1	3
CHEM 3321 Laboratory in Organic Chemistry 1	1	*CHEN 3220 Chem Engr Separations & Mass Transfer	3
*CHEN 3210 Chemical Engineering Heat Transfer	4	*CVEN 3227 Probability, Statistics & Decisions	3
CVEN 3323 Hydraulic Engineering	3	*CVEN 3424 Water and Wastewater Treatment	3
CVEN 3525 Structural Engineering 1	3	*CVEN 3454 Water Chemistry	4
Senior, Fall	**16**	**Senior, Spring**	**15**
CVEN 3246 Introduction to Construction	3	*CVEN 4333 Engineering Hydrology	3
CVEN 3708 Geotechnical Engineering 1	3	*CVEN 4423 Water Resources Engr Design	3
CVEN 4039 Senior Seminar	1	*CVEN 4474 Hazard & Industrial Waste Management	3
Thermodynamics[b]	3	*MCEN 4131 Air Pollution Control	3
Numerical Methods[c]	3	Required Communication Course[d]	3
H&SS Elective IV	3	Free Elective[e]	1
Fifth Year, Fall	**15**		
CVEN 3535 Structural Engineering 2	3		
*CVEN 4147 Engineering Economics	3		
*CVEN 4434 Environmental Engineering Design	3		
*CVEN 4484 Environmental Microbiology	3		
H&SS Elective V	3		

Total Credit hours 143

*only offered in the semester shown.

[a]a total of 18 credit hours of humanities and social sciences (H&SS) electives is required. At least six hours must be at the upper division (3000 or 4000) level. Required Communication Course must be taken at the 3000-level or above.

[b]Thermodynamics options: CHEN 3320 Chemical Engineering Thermodynamics (F), MCEN 3012 Thermodynamics (S&F).

[c]Numerical Methods: APPM 4650 Intermediate Numerical Analysis 1 (S&F), CHEN 4580 Numerical Methods for Process Simulation (F), MCEN 4030 Computational Methods (S)

[d]Usually WRTG 3030 or HUEN 3100 Humanities for Engineers 1 and HUEN 3200 Humanities for Engineers 2.

[e]Free elective: This one credit may be used for a H&SS or technical elective.

2.3. Concurrent Bachelor of Science/Master of Science Degree

The Environmental Engineering Program is cooperating with the Civil, Environmental, and Architectural Engineering Department to offer concurrent EVEN BS/CVEN MS degrees in a five-year curriculum (currently, this is the only concurrent BS/MS degree that includes the EVEN BS degree). To fit the BS and MS degrees in only five years, students are allowed to count two technical elective courses (6 credit hours) taken at the graduate level for both the EVEN BS and CVEN MS degrees. Students must first complete the four-year Environmental Engineering Bachelor of Science curriculum (Section 2.1); they then complete the requirements of the CVEN MS degree in the graduate programs of either Environmental Engineering or Water Resources Engineering.

The purpose of the concurrent EVEN BS/CVEN MS degrees is to allow capable students to gain greater depth of knowledge in environmental engineering by jointly pursuing BS and MS degrees. The concurrent degree program offers students greater flexibility in scheduling technical electives and graduate courses and to enable them to obtain BS and MS degrees in five years.

Students seeking to pursue the concurrent EVEN BS/CVEN MS degrees must achieve a minimum grade point average of 3.25 when they submit an application for admission to the program. Students are expected to submit an application during the sixth or seventh semester of their undergraduate program in EVEN (75 to 110 credit hours). Applications are made to the Civil, Environmental, and Architectural Engineering Department. The following items are needed to complete an application:

- Concurrent EVEN BS/CVEN MS Degrees application form (no application fee)
- Four letters of recommendation
- University of Colorado Application for Graduate Admission form, Part II only
- Certification by the EVEN Program that the required number of coursework hours have been completed
- Copy of internal transcript

The application deadlines are April 30 for admission to the program for the following fall and October 30 for admission for the following spring semester.

To continue in the program, students must maintain full-time status with a cumulative GPA of 3.25 to remain in the program. In addition, to count the two graduate courses (6 credit hours) for both the EVEN BS and CVEN MS degrees, the student must achieve a grade point average of at least 3.5 in the 24 credit hours taken immediately after admission to the program. For the CVEN MS, students may complete the requirements for either the Plan I (thesis) or Plan II (course work only) Master of Science degrees.

Students admitted to the concurrent EVEN BS/CVEN MS degrees program who do not meet the requirements for completing the concurrent degrees or who elect not to complete the concurrent degrees may count appropriate graduate courses toward the technical elective (up to 9 credit hours) and option course (up to 12 credit hours) requirements for the EVEN BS.

Students pursuing the EVEN BS/CVEN BS dual degrees are encouraged to seek advice from one of the Civil, Environmental, and Architectural Engineering faculty participating in the Environmental Engineering Program (see Section 6).

3. Advising

3.1. Advising Process

Each Fall and Spring semester, just prior to the registration period for the following semester, students are required to meet with their faculty advisors for academic counseling. In the Environmental Engineering Program, faculty engage in academic counseling to promote greater student-faculty interaction. Faculty advisors are also available for academic and career counseling beyond the required meetings each semester at the student's request.

A few weeks before each advising period, the Program Coordinator will announce to students and faculty advisors by email the advising period schedule. With this email, an updated version of these *Degree Guidelines* and other advising information will be sent.

Students must make an appointment with their faculty advisors during the advising period. Faculty advisors will give meetings with advisees high priority during this time. In preparation for the meeting, students should assemble a proposed course plan for the following semester using these *Degree Guidelines* and the course schedule for the following semester (published in the University of Colorado *Registration Handbook* each semester or available on the University of Colorado Personal Look-Up Service (PLUS) web page (http://www.colorado.edu/plus/planner/).

During the advising meeting, students must discuss their proposed course plan with their faculty advisor. Faculty advisors will record course selections on the Degree Requirements Worksheet (see Forms Appendix). Faculty advisors will also be available to counsel the students on academic performance, long-term course plans, graduation requirements, career planning, and any other personal issues that affect the student's education. At the conclusion of the meeting, the faculty advisor will sign the students' academic file certifying that advising has been done.

After the advising meeting, students are required to fill out an Advising Evaluation Form (see Forms Appendix) to provide feedback on the advising process. These forms must be submitted to the Program Coordinator.

Once the Coordinator has received a student's academic file with the signature of the faculty advisor (from the faculty advisor) and the Advising Evaluation Form (from the student), the Coordinator will "raise the flag" to allow the student to register.

Many academic advising questions pertain to the "logistics" of course scheduling and registration. Most of these questions should be directed to the Program Coordinator (see the cover sheet for contact information) instead of the faculty advisors. The Coordinator will provide assistance on procedural questions involving registration, degree plans, graduation requirements, and the petition process. In addition, the Coordinator will help students determine whether a particular situation should be discussed with their faculty advisor.

3.2. Program Contact with Students

Official notices to students concerning Environmental Engineering Program advising, curriculum, registration, graduation requirements, and policies will be made by e-mail. By default, official notices will be sent to your University e-mail address as listed on the student directory on the web ("411," http://www.colorado.edu/search/). You may arrange to also receive official notices at a non-University e-mail address of your choice by notifying the Program Coordinator; however, the Coordinator will provide this service only as convenience to you. The Coordinator will not responsible for information sent to abandoned e-mail addresses. To reiterate, the Program is required to notify you only at your University e-mail address.

3.3. Academic Records

An official Environmental Engineering Program academic file will be maintained for each student by the Program Coordinator. This file will contain copies of official documentation related to academic history and progress.

The Environmental Engineering Program Coordinator and faculty advisors will strive to provide you complete, timely, and accurate academic advising, but ultimately, the responsibility of meeting graduation requirements is yours. Consequently, you should ensure that all copies of relevant paperwork are present in your academic file and that you keep your own copies of critical information.

3.4. Additional Advising Resources

Students may also be referred to various College of Engineering and Applied Science and University of Colorado counselors for certain issues. Many of the College's student support services are listed on the College web page

(http://www.colorado.edu/engineering/ss_undergrad.html). At the University level, students may consult with the following groups:

- Career Services – provides services for resume and interview skills improvement, internship and job postings, and career fairs (http://www.colorado.edu/careerservices/, 34 Willard Hall, 303 492 6541)
- Counseling and Psychological Services: A Multicultural Center -- provides a variety of programs and assistance to address general academic or personal issues. (http://www.colorado.edu/sacs/counseling/, 134 Willard Hall, 303 492 6766)

3.5. Faculty Advisor Assignments

Freshmen, change-of-major, and transfer students entering the Environmental Engineering Program will be assigned a faculty advisor (Table 3). To foster better student-advisor relationships, faculty advisors will follow students through the four-year EVEN BS program.

Incoming freshmen are assigned to one of the academic advisors listed for freshmen – consult the Program Coordinator about your assigned faculty advisor.

Incoming change-of-major and transfer students will initially be advised by the Program Director. At the first advising meeting for change-of-major and transfer students, transfer credits will be evaluated and a complete course plan to meet graduation requirements will be formulated. After the initial advising, change-of-major and transfer students will be directed to a faculty advisor handling the class to which the incoming student is assigned.

Table 3. Faculty advisor assignments by class for the 2002-2003 academic year.

class	faculty advisor	room	phone	email
freshman (*£30 hours*)	Joseph Ryan	ECOT 517	492 0772	joseph.ryan@colorado.edu
sophomore (*30< hours £60*)	Jana Milford	ECME 214	492 5542	jana.milford@colorado.edu
junior (*60< hours £90*)	Melvyn Branch	ECME 210	492 3578	melvyn.branch@colorado.edu
	Diane McKnight	ECCE 110	492 4687	diane.mcknight@colorado.edu
senior (*>90 hours*)	Richard Noble	ECCH 112	492 6100	richard.noble@colorado.edu
	Fred Ramirez	ECCH 126	492 8660	fred.ramirez@colorado.edu
	JoAnn Silverstein	ECOT 515	492 7211	joann.silverstein@colorado.edu
5th year senior	Angela Bielefeldt	ECOT 516	492 8433	angela.bielefeldt@colorado.edu
	Steven George	Ekeley S159	492 3398	steven.george@colorado.edu
transfers (initial advising)	Joseph Ryan	ECOT 517	492 0772	joseph.ryan@colorado.edu

4. Academic Policies

4.1. Prerequisite and Co-Requisite Courses

Most of the courses in the Environmental Engineering curricula have prerequisite and co-requisite requirements (see the last two tables in the Forms and Appendix). The purpose of these requirements is to ascertain that you are adequately prepared for subsequent courses.

Students must successfully complete all prerequisite courses before enrolling for a required course in the Environmental Engineering curricula. Students must also simultaneously enroll in and complete satisfactorily (grade of C- or better) all co-requisite courses. Successful completion means receiving a grade of C- or better. Grades of D+, D, D-, F, IF, or IW do not satisfy this requirement.

Successful completion of prerequisite and co-requisite courses will be monitored for all required courses in the Environmental Engineering curricula by the Program Coordinator. Students who do not successfully complete (grade below C-) prerequisite and co-requisite courses must re-take those courses before advancing in the curricula. Students required to re-take courses are strongly urged to consult their faculty advisor before re-taking courses to evaluate areas in which academic performance can be achieved.

The prerequisite and co-requisite policy applies only to required and option courses in the curricula. If a student has not satisfied all of the prerequisite and co-requisite requirements for an elective course (technical, humanities & social sciences, chemistry), that elective course may be taken with the approval of the instructor.

Courses not listed in the curricula may be used to satisfy prerequisite and co-requisite requirements if transfer credit has been approved or a petition to the Environmental Engineering Program has been approved. Generic College of Engineering and Applied Science petition forms for this purpose may be obtained from the Program Coordinator.

4.2. Transfer Credit

Five different kinds of students transfer into the Environmental Engineering program:

- students changing majors from the College's Open Option major to EVEN
- students changing majors from another of the College's engineering degrees to EVEN
- students changing majors from another College or School in the University of Colorado to EVEN
- students changing majors from another campus of the University of Colorado to EVEN
- students transferring from another institution

For all transfer students, the College of Engineering and Applied Science requires that the last 45 credit hours used to fulfill degree requirements must be taken as a regular degree student in the College of Engineering and Applied Science in the University of Colorado at Boulder. More details about the College of Engineering Applied Science transfer credit policies are available in the Dean's office or online at the following URL on the College of Engineering and Applied Science web page (http://www.colorado.edu/engineering/General/TransferCreditPolicy.pdf).

4.2.1. Change of Major: From the College's Open Option to EVEN

The EVEN program accepts the College of Engineering and Applied Science Open Option curriculum as a substitute for its own first-year curriculum. Grades of C- or better must have been achieved for all courses counting for required courses in the EVEN curriculum. Students changing from Open Option to EVEN must complete a change-of-major form for the College. A description of the College's Open Option is available online on the College web page (http://www.colorado.edu/engineering/General/OpenOption.pdf).

4.2.2. Change of Major: From a College Engineering Degree to EVEN

Evaluation of the credit hours earned in another engineering degree curriculum in the College of Engineering and Applied Science for credit in EVEN will be done at the first advising meeting with the EVEN Program's Director. Grades of C- or better must have been achieved for all courses counting for required courses in the EVEN curriculum. Because EVEN is a multi-department program, most students coming into EVEN from other engineering degree programs in the College are able to transfer most of their basic courses for credit toward the EVEN BS degree. Students changing from another engineering degree to EVEN must complete a change-of-major form for the College.

4.2.3. Change of Major: From Another College or School to EVEN

Students transferring into EVEN from another of the University of Colorado's Colleges and Schools (e.g., College of Arts and Sciences, School of Business) must first complete an Intra-University Transfer (IUT) application to the College of Engineering and Applied Sciences (details are available in the Dean's Office or at

http://www.colorado.edu/engineering/General/IUT.pdf). Once the application is approved, credit hours from the non-engineering degree will be evaluated for EVEN credit at the first advising meeting with the EVEN Program's Director. Students changing majors to EVEN from non-engineering degrees must complete the mathematics, chemistry, and physics requirements of the first year of the College's Open Option curriculum to apply for IUT; therefore, they will typically start EVEN with credit for most of the first year of the EVEN curriculum.

4.2.4. Change of Major: From Another Campus of the University of Colorado System

Students transferring into EVEN from another campus of the University of Colorado system will, in almost all cases, have the same status as transfers from the University of Colorado at Boulder. Students from other campuses should refer to the three change-of-major sections above. More details on Intercampus Transfer to the College of Engineering and Applied Sciences are available in the Dean's Office or online (http://www.colorado.edu/engineering/General/ICT.pdf).

4.2.5. Transfer from Another Institution

For students coming to the EVEN Program from an engineering degree at another institution, an initial transfer credit evaluation is performed by the University Admissions Office using the official transcript from the previous institution). Courses in which the student received a grade lower than a C- will not be accepted by the Admissions Office.

Once the Admissions Office has completed its evaluation, the student will meet with the EVEN Director for evaluation of transfer credits for the EVEN curriculum. Note that acceptance of transfer credits by the Admissions Office does not mean that the transfer credits will count toward the EVEN BS degree; courses taken at another institution must match the course requirements for the EVEN curricula. In most cases, identification of courses is straightforward; however, for some courses, the EVEN Director may request documentation of course content (catalog descriptions, course syllabi).

4.2.6. Advanced Placement Credit

Advanced Placement (AP) credit may be approved on the basis of College Entrance Examination Board's Advanced Placement tests. For students who have taken advanced placement courses in high school and who achieve the required score in the CEEB's AP examination, advanced placement credit will be granted by the College of Engineering and Applied Sciences as part of the admission process. Advanced placement credits must also be evaluated for credit toward the EVEN curricula by the student's faculty advisor or the EVEN Director. If a student later takes a course for which advanced placement credit was granted, the credit for the course taken at the University of Colorado will replace the AP credit.

For a listing of CU course equivalents for typical advanced placement credit, see the College of Engineering and Applied Science Advanced Placement and MAPs guidelines (available in the Dean's office or online at http://www.colorado.edu/engineering/General/AdvancedPlacement.pdf).

4.2.7. Continuing Education Courses

Courses may be taken for EVEN degree credit through programs offered by the University of Colorado's Division of Continuing Education (see a full description at http://www.colorado.edu/ContEd/):

- Maymester
- Summer Session
- Available Credit for Eligible Special Students (ACCESS)
- Center for Advanced Training in Engineering and Computer Science (CATECS)
- Boulder Evening Credit
- Independent Learning
- Concurrent High School

A maximum of 16 credit hours taken through Continuing Education programs other than Maymester and Summer Session can be applied to the EVEN BS degree (Maymester and Summer Session courses are equivalent to courses offered during the regular academic year). A maximum of 8 of the 16 credit hours can be taken as Humanities and Social Sciences courses. According to the College of Engineering and Applied Science, students must secure advance approval of the Environmental Engineering Program and the Dean's Office prior to registering for Continuing Education courses.

4.2.8. Transfer Credit Evaluation for Dual Bachelor of Science Degrees

Students pursuing dual BS degrees (EVEN/CHEN or EVEN/CVEN) must have transfer credit evaluations performed by each degree program.

4.3. Humanities and Social Sciences Electives

4.3.1. Importance of Humanities and Social Sciences to Environmental Engineers

The purpose of humanities and social sciences (H&SS) electives is to broaden the engineering education. In environmental engineering, appreciation and knowledge of the social, historical, political, and economic context of environmental problems is critically important. The EVEN BS degree requires 18 credit hours of H&SS courses. One H&SS course is required – a required communications course (see section 4.3.2) – to improve writing and oral presentation skills. For the remaining 15 credit hours of the H&SS requirements, the EVEN faculty recommended that you select a sequence of courses that complement and broaden your education in environmental engineering and that you avoid random selection of unrelated introductory courses. Some H&SS courses that might be of interest to environmental engineers includes

- Environmental Design 2001 Introduction to Social Factors in Environmental Design
- Economics 3545 Environmental Economics
- Geography 2412 Environment and Culture
- History 4267 Mining in the Western United States
- History 4417 Environmental History of North America
- Molecular, Cellular, and Developmental Biology 1030 Plagues, People, and Microorganisms
- Peace and Conflict Studies 3520 Environmental Dimensions of International Security
- Philosophy 2140 Environmental Justice
- Philosophy 3140 Environmental Ethics
- Political Science 3201 Environment and Public Policy
- Sociology 3091 Environment and Society

Additional courses of interest to environmental engineers may be found in the required and recommended curricula for the Environmental Studies program in the College of Arts and Sciences (http://www.colorado.edu/envirostudies/).

4.3.2. Humanities and Social Sciences Requirements

The Environmental Engineering Program follows the College of Engineering and Applied Science H&SS requirements (available online at http://www.colorado.edu/engineering/General/HSS.pdf). A total of 18 credit hours of H&SS electives is required for graduation. At least six of the required credit hours must be at the upper division level (3000- or 4000-level courses). In accordance with the rules of the College of Engineering and Applied Science, a course on writing and oral presentations (WRTG 3030 Writing on Science and Society) is required (some options are listed below). This course provides 3 credit hours of upper division H&SS credit. The remaining courses must be selected from the College's approved H&SS course list (available online at http://ecad100.colorado.edu/homer/). Petitioning for the approval of courses not on the approved list is allowed (see below).

Some substitutes for WRTG 3030 are accepted by the College of Engineering and Applied Sciences and the EVEN Program. The Herbst Humanities Program (http://www.colorado.edu/engineering/herbst/) offers a two-semester (6-credit) sequence of seminar courses (HUEN 3100 Humanities for Engineers 1, HUEN 3200 Humanities for Engineers 2) that can be substituted for WRTG 3030 and the upper division H&SS course. If students take only HUEN 3100, credit is given only for the upper division H&SS course. Occasionally, other writing courses have been offered in the College of Engineering and Applied Science (e.g., GEEN 3000 Professional Communications for Engineers, GEEN 3860 Writing and Communication in Engineering) that may be substituted for WRTG 3030.

Students may petition the College of Engineering and Applied Sciences for approval of a H&SS course not on the *HOMER* list. It is strongly suggested that the petition be approved before enrolling in the course.

4.3.3. Some Specific Inclusions and Exclusions for the H&SS List

Foreign language courses generally satisfy the humanities and social science requirements.

The first seminar in the Minority Engineering Program (GEEN 1510) provides one hour of lower division H&SS credit; the second course (GEEN 1520) provides no credit.

Generally, courses in performance and the fine arts, mathematics, and natural sciences are not acceptable as H&SS electives. The following courses are specifically excluded as satisfying H&SS requirements:

- courses in painting, sculpture, photography, and other fine arts
- courses in musical instruments, band, choir, and other performance courses
- courses in accounting, finance, personnel administration, and other business practices

4.3.4. Advice on Humanities and Social Sciences Course Selection

Guidance in the H&SS course selection process is available through the College of Engineering and Applied Sciences (see the online guide *HOMER*, http://ecad100.colorado.edu/homer/). Students may also consult the College's Humanities & Social Science Advisor (Prof. Erik Fisher, Room ECOT 420, 492-3883, erik.fisher@colorado.edu).

4.4. Technical Electives

4.4.1. Overview of Technical Electives

Technical electives provide an opportunity for students to explore a range of engineering, mathematical, and natural sciences topics to provide increased breadth or to focus on a specific technical area to develop in-depth understanding. Although students are given great latitude in selecting electives, they are strongly encouraged to choose technical electives wisely to complement their undergraduate engineering experience. Students should consult their faculty advisors to plan their elective program.

4.4.2. Technical Elective Requirements

The EVEN BS curriculum requires 9 credit hours of technical electives. One of the technical elective courses (3 credit hours) may be a lower division (1000-, 2000-level) "environmental" science course (e.g., biology, geology, geography) that serves as a prerequisite for a later upper-division technical elective or Option course. The remaining technical elective courses (6 credit hours) must be taken at the 3000-level and above in engineering, mathematics, and natural sciences. These courses must have substantially different content than EVEN required courses. Exceptions to these rules will be considered by petition to the Environmental Engineering faculty. Graduate courses (5000-level and above) may also be taken as technical electives; admission to graduate courses requires the consent of the instructor.

Technical electives counted toward the graduation requirements for the EVEN BS degree may not be taken pass/fail.

4.4.3. Specific Inclusions and Exclusions for Technical Electives

Independent study (see Section 4.7) is accepted as technical elective credit up to a maximum of 6 credit hours.

A maximum of 3 credit hours of Reserve Office Training Corps (ROTC) courses may be used as technical electives upon commissioning.

Courses in communications and foreign languages do not count as technical electives.

4.4.4. Advice on Technical Electives

Students should consider using the allowance of three credit hours for a lower-division technical elective that will fulfill prerequisites for upper division courses of interest. For example,

- ATOC 1050 Weather and the Atmosphere
- EPOB 1210 General Biology 1
- GEOL 1010 Introduction to Geology 1
- GEOL 1060 Global Change 1 – An Earth Science Perspective
- GEOG 1001 Environmental Systems I – Climate and Vegetation
- MCDB 1150 Introduction to Cellular and Molecular Biology

4.5. Independent Study

4.5.1. Introduction to Independent Study

An independent study is a collaboration between a student and a faculty on a special project that provides the student with a learning experience. An independent study may also fill an academic need of importance to the student that cannot be filled by the regular course offerings. Independent studies are opportunities for students to earn credit for learning outside the normal lecture and laboratory class structure.

In the EVEN BS curriculum, independent studies may be counted as technical electives (up to a maximum of six credit hours). Independent studies may be conducted in any increment of credit hours up to a maximum of 3 credit hours per semester, with one credit hour representing 25 hours of actual work on the task or project. The Environmental Engineering Program encourages students to consider independent study to engage in a long-term research project with a faculty member.

4.5.2. Independent Study Requirements

The following rules apply to independent studies:

- a maximum of 6 credit hours of independent study may be applied to EVEN BS degree requirements as technical electives.
- independent studies may not be applied as Option courses.
- a maximum of 3 credit hours of independent study may be taken per semester.
- independent studies may be supervised by any appropriate University of Colorado faculty member.
- a proposal for an independent study must be made by filling out the Independent Study Agreement Form and submitting the form to the EVEN Program Coordinator.
- the EVEN director must approve the proposed independent study.
- a final product of the independent study must be submitted to the Environmental Engineering Program before a grade will be sent to the registrar's office for posting.
- approval of a second independent study is contingent on successful completion of the requirements for the first independent study. A copy of the Independent Study Agreement Form for the previous independent study must accompany the second application.
- Independent studies may not be arrange retroactively.
- independent study credit is not allowed for internship experiences, work-study, or work done for pay, following University rules.

4.5.3. Independent Study Procedures

To propose an independent study, students must first determine with a collaborating faculty member the topic, goals, number of credit hours (up to 3 per semester), work plan, and required product for the independent study. This information must be recorded on an Independent Study Agreement Form (see Forms Appendix) and submitted to the EVEN Program Coordinator before the drop/add deadline of the current semester.

The independent study proposal will be reviewed by the EVEN Director and approved, returned for amendment, or disapproved owing to some deficiency in the proposal. The student will conduct the independent study under the guidance of the faculty advisor. At the end of the independent study, the student must submit to the Environmental Engineering program a copy of the final product (a report, a computer code, etc.) in addition to any required products due to the collaborating faculty.

4.6. Petitions

4.6.1. Petition Rules and Guidelines

Any exceptions or waivers of the rules and regulations of the Environmental Engineering Program or the College of Engineering and Applied Science must have prior approval by petition. The petition must be completed and submitted to the Environmental Engineering Program for approval; the petition will then be forwarded to the Dean's Office. It is the student's responsibility to follow up on the petition's progress. Petition forms may be obtained from the Program Coordinator.

The following list provides some examples of situations for which a petition is required:

- enrolling in a course when prerequisites have not been satisfied
- substituting for a required course
- dropping or adding a course after deadlines
- requesting the pass/fail grade option for a course

Follow these guidelines when completing the petition:

- review the rules and policies of the College of Engineering and Applied Science as published in the *University of Colorado Course Catalog* published during the year of your admission to the College and the current edition(s) of the appropriate Advising Guide to establish your need to petition and the specific rule or policy you wish to waive.

- consult with the Program Coordinator and faculty advisor for clarification of Program rules and policies.
- write the petition clearly (and neatly!).
- provide complete information in the petition, including the number and title of all courses and pertinent data such as course syllabi.

If properly completed, the petition process will normally take 1-2 weeks.

4.6.2. One-Time Forgiveness Policy

The College of Engineering offers a one-time forgiveness policy to allow correction of a significant registration error resulting in an unanticipated grade. As indicated by the title, the forgiveness policy can be used only once. Forgiveness may be requested in a petition describing the registration error. Students on academic probation or suspension may not use this policy.

4.7. Academic Honesty

The Environmental Engineering Program adheres to the policies of the College of Engineering and Applied Science and the University of Colorado at Boulder on academic honesty, which states:

> "As members of the academic community, students have a responsibility to conduct themselves with the highest standards of honesty and integrity. These qualities are also vital to the profession of engineering. Violations of academic ethics tarnish the reputation of all students and will be treated with the utmost seriousness."

Be forewarned and discourage your fellow students from participating in any unethical activities. The following are examples of some, but certainly not all, acts that violate academic ethics:

- plagiarizing
- cheating on assignments and exams
- possessing or observing of exams or solutions to examinations prior to the exam
- altering, forging, or falsifying official records
- performing work or taking an exam for another student
- providing material of your own or of others to a fellow student

The College of Engineering and Applied Science procedures for handling academic ethics violations are available in the Dean's Office and on the College of Engineering and Applied Science web site (http://www.colorado.edu/engineering/General/StudentAcademicHonesty.pdf). University academic honesty policies are available online (http://www.colorado.edu/academics/honorcode/).

5. Graduation Requirements

5.1. Requirements for EVEN BS Degree

To graduate with a Bachelor of Science degree in Environmental Engineering from the College of Engineering and Applied Science at the Boulder campus, students must meet the following minimum requirements:

1. Satisfactory completion of the required and elective courses in the Environmental Engineering Bachelor of Science curriculum (see Section 2.1.). Students must satisfactorily complete 128 credit hours, of which the last 45 credit hours shall be earned after admission to the College of Engineering and Applied Science as a degree student.
2. A minimum cumulative grade point average of 2.000 for all courses attempted and for all courses that count toward graduation requirements, excluding "P" grades for courses taken Pass/Fail.
3. A minimum cumulative major grade point average of 2.000. This major grade point average includes only course work in engineering courses.
4. Successful completion of the Minimum Academic Preparation Standards (MAPS) requirement of the College of Engineering and Applied Science.
5. Completion of the Fundamentals of Engineering (FE) examination during the final academic year.
6. Submission of a completed Diploma Card (available in the Dean's Office) to the Program Coordinator.

Graduation will be postponed by failure to complete these requirements.

Any exceptions to these requirements will require approval of the Environmental Engineering Program Director and the Dean's office by petition.

To be sure that all requirements are met, students can consult with the Environmental Engineering Program Coordinator, Director, and their faculty advisors. Students must be aware that meeting graduation requirements is ultimately their own responsibility.

5.2. Fundamentals of Engineering Exam

One of the requirements for graduation with the EVEN BS degree is that students must take the Fundamentals of Engineering (FE) Exam. This test serve two purposes: (1) it provides students with the opportunity to complete the first step toward Professional Engineer (PE) status and (2) it provides the Environmental Engineering Program with a useful assessment of engineering proficiency attained by EVEN graduates. Students usually take the FE Exam during their final semester.

The Fundamentals of Engineering Examination is the first step toward achieving licensure as a Professional Engineer (PE), a particularly important credential for engineers working as consultants. The FE Exam is administered by the National Council of Examiners for Engineering and Surveying (NCEES; http://www.ncees.org). The FE Exam is offered semi-annually, in April and October. Students can register to take the FE Exam in the Dean's office. Registration notices will be distributed by the EVEN Program Coordinator.

The exam consists of two parts, the morning and afternoon "specifications." The morning specification covers engineering, science, and mathematics fundamentals. The afternoon specification is discipline-specific. Beginning with the April 2002, exam, Environmental Engineering will be offered as the afternoon specification. The NCEES offers general information, study materials, and sample questions for the FE Exam. Numerous review books for the FE Exam are also readily available at web booksellers.

5.3. Requirements for Dual BS Degrees

5.3.1. General Requirements

Students may choose to pursue a second Bachelor of Science degree simultaneously with the EVEN BS degree. The second BS degree may be pursued in an College or School at the University of Colorado at Boulder. To do this, they must (1) satisfy the requirements of both BS degree curricula and (2) take a minimum of 30 credit hours beyond the credit hour requirement for the degree with the higher credit hour requirement. If the requirements of both curricula can be satisfied with fewer than 30 credit hours, the difference can be made up with elective courses.

5.3.2. Special Requirements for Dual BS Degrees with Chemical Engineering and Civil Engineering

Environmental Engineering students pursuing dual BS degrees with Chemical Engineering (CHEN) or Civil Engineering (CVEN) may earn both degrees by (1) satisfying the requirements of both curricula and (2) completing a minimum of 15 credit hours beyond the credit hour requirement of the EVEN BS degree. The credit hour requirement for the EVEN BS degree is 128 credit hours; therefore, the dual BS degrees require a minimum of 143 credit hours. The details of the dual BS degree curricula are available in sections 2.2 and 2.3 of these *Guidelines*.

6. Faculty Directory

More than twenty College of Engineering and Applied Science faculty are affiliated with the Environmental Engineering Program. These faculty are rostered in the Aerospace Engineering Sciences, Chemical and Biological Engineering, Civil, Environmental and Architectural Engineering, and Mechanical Engineering departments.

Gary Amy, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., San Jose State U. (1970, 1971), Ph.D., University of California at Berkeley (1978)
Teaching: CVEN 3414 Introduction to Environmental Engineering, CVEN 3424 Water and Wastewater Treatment
Research: Potable Water Treatment and Water Chemistry
Email: gary.amy@colorado.edu, phone: 303 492 6274, office: ECOT 513

Angela Bielefeldt, Associate Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., Iowa State University (1992), M.S., Ph.D., University of Washington (1994, 1996)
Teaching: CVEN 4434 Environmental Engineering Design, CVEN 4474 Hazardous Waste Management
Research: Biological Treatment of Hazardous Organic Compounds, Subsurface Bioremediation
Email: angela.bielefeldt@colorado.edu, phone: 303 492 8433, office: ECOT 516

Melvyn Branch, Professor, Mechanical Engineering
Education: B.S.E., Princeton U. (1966), M.S., Ph.D., University of California at Berkeley (1968, 1971)
Teaching: MCEN 4152 Introduction to Combustion, MCEN 4162 Energy Conversion
Research: Combustion-Generated Air Pollution, Hazardous Waste Destruction, Combustion Chemistry
Email: melvyn.branch@colorado.edu, phone: 303 492 7427; office: ECME 210

John Daily, Professor, Mechanical Engineering
Education: B.S., M.S., U. Michigan (1969, 1970), Ph.D., Mechanical Engineering, Stanford University (1975)
Research: Hazardous Waste Destruction, Combustion, Propulsion
Email: john.daily@colorado.edu, phone: 303 492 7110, office: ECME 224

Robert Davis, Professor, Chemical and Biological Engineering, and Dean, College of Engineering and Applied Science
Education: B.S., University of California at Davis (1978), M.S., Ph.D., Stanford (1979, 1983)
Research: Fluid Mechanics, Environmental Membrane Separations, Membrane Filtration and Microflotation
Email: robert.davis@colorado.edu, phone: 303 492 7314, office: ECCH 108

William Emery, Professor, Aerospace Engineering Science
Education: B.S., Brigham Young U. (1971), Ph.D., U. Hawaii (1975)
Teaching: EVEN 4830 Environmental Satellite Remote Sensing
Research: Satellite Remote Sensing of Oceans, Vegetation and Atmosphere
Email: william.emery@colorado.edu, phone: 303 492 8591, office: ECME 275

John Falconer, Professor, Chemical and Biological Engineering
Education: B.E.S., Johns Hopkins University (1967), M.S., Ph.D., Stanford University (1968, 1974)
Teaching: CHEN 1211 General Chemistry for Engineers, CHEN 3320 Thermodynamics
Research: Heterogeneous Catalysis, Environmental Catalysis, Zeolite Membrane Separations
Email: john.falconer@colorado.edu, phone: 303 492 8005, office: ECCH 132

Michael Hannigan, Professional Research Associate, Mechanical Engineering
Education: B.S., Southern Methodist University (1990), M.S., Ph.D., California Institute of Technology (1991, 1997)
Teaching: EVEN 4830 Special Topics – Environmental Toxicology
Research: Characterization and Abatement of Air Pollution
Email: michael.hannigan@colorado.edu, phone: 303 735 5045, office: ECME 215A

Mark Hernandez, Associate Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., Ph.D., University of California at Berkeley (1986, 1988, 1994)
Teaching: CVEN 3414 Introduction to Environmental Engineering, CVEN 4484 Environmental Microbiology
Research: Biological Waste Treatment Processes, Subsurface Bioremediation, Microbiology of Aerosols
Email: mark.hernandez@colorado.edu, phone: 303 492 5991, office: ECOT 518

Jean Hertzberg, Associate Professor, Mechanical Engineering
Education: B.S., U. Michigan (1981), M.S., Ph.D., University of California at Berkeley (1983, 1986)
Teaching: MCEN 3012 Thermodynamics, MCEN 4030 Computational Methods
Research: Combustion Fluid Mechanics, Hazardous Waste Destruction
Email: jean.hertzberg@colororado.edu, phone: 303 492 5092; office: ECME 220

Lakshmi Kantha, Professor, Aerospace Engineering Science
Education: B.E., M.E., Bangalore Univ. (1967, 1969), Ph.D., Massachusetts Institute of Technology (1973)
Research: Numerical Modeling of Oceans and Related Physical Processes
Email: lakshmi.kantha@colorado.edu, phone: 303 492 3014, office: ECNT 319

Jeremy Kolenbrander, Adjunct Professor, Environmental Engineering
Education: B.S., U. Colorado (1992), M.S., Stanford University (1994)

Teaching: EVEN 4830 Environmental Sampling
Email: jeremy.kolenbrander@gambrobct.com

Kristine Larson, Associate Professor, Aerospace Engineering Science
Education: A.B., Radcliffe College (1985), Ph.D., Scripps Institute of Oceanography (1990)
Teaching: ASEN 4519 GPS Applications
Research: GPS in Geophysical Research
Email: kristine.larson@colorado.edu, phone: 303 492 6583, office: ECOT 634

Diane McKnight, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., Ph.D., Massachusetts Institute of Technology (1975, 1978, 1979)
Teaching: CVEN 3434 Applied Ecology
Research: Aquatic Ecology, Aquatic Chemistry
Email: diane.mcknight@colorado.edu, phone: 303 492 4687, office: ECCE 110

Jana Milford, Associate Professor, Mechanical Engineering
Education: B.S., Iowa State University (1983), M.S., Ph.D., Carnegie Mellon University (1985, 1988)
Teaching: MCEN 4131 Air Pollution Control
Research: Air Quality Modeling, Atmospheric Chemistry
Email: jana.milford@colorado.edu, phone: 303 492 5542, office: ECME 214

Shelly Miller, Assistant Professor, Mechanical Engineering
Education: B.S., Harvey Mudd College (1986), M.S., Ph.D., University of California at Berkeley (1991, 1996)
Teaching: MCEN 4131 Air Pollution Control, MCEN 4141 Indoor Air Pollution
Research: Indoor Air Quality, Bioaerosols
Email: shelly.miller@colorado.edu, phone: 303 492 0587; office: ECME 222

Richard Noble, Professor, Chemical and Biological Engineering
Education: B.E., M.E., Stevens Institute of Technology (1968, 1969), Ph.D., U. California, Davis (1976)
Teaching: CHEN 3210 ChemE Heat Transf, CHEN 3220 ChemE Sepr & Mass Transf, CHEN 4670 Environ Separations
Research: Chemically Specific Separations, Zeolite Membranes, Separations Using External Fields
Email: richard.noble@colorado.edu, phone: 303 492 6100, office: ECCH 122

Hari Rajaram, Associate Professor, Civil, Environmental, and Architectural Engineering
Education: B.Tech., IIT, Madras (1985), M.S., U. Iowa (1987), Sc.D., M.I.T. (1991)
Teaching: CVEN 4353 Groundwater Engineering
Research: Groundwater and Contaminant Hydrology, Stochastic Modeling of Transport Processes
Email: hari.rajaram@colorado.edu, phone: 303 492 6604, office: ECOT 514

Fred Ramirez, Professor, Chemical and Biological Engineering
Education: B.S., M.S., Ph.D., Tulane University (1962, 1964, 1965)
Teaching: CHEN 4680 Environmental Process Engineering
Research: Process Simulation and Control
Email: fred.ramirez@colorado.edu, phone: 303 492 8660, office: ECCH 126

Joseph Ryan, Associate Professor, Civil, Environmental, and Architectural Engineering; EVEN Director
Education: B.S., Princeton U. (1983), M.S., Ph.D., Massachusetts Institute of Technology (1988, 1992)
Teaching: CVEN 3454 Water Quality, CVEN 4424 Aquatic Organic Contaminants
Research: Contaminant Fate and Transport in Natural Waters, Surface and Colloid Chemistry
Email: joseph.ryan@colorado.edu, phone: 303 492 0772, office: ECOT 517

JoAnn Silverstein, Professor and Chair, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., Ph.D., University of California at Davis (1978, 1980, 1982)
Research: Biological Treatment of Contaminants in Water and Wastes, Water Recycling
Email: joann.silverstein@colorado.edu, phone: 303 492 7211, office: ECOT 515

Scott Summers, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., University of Cincinnati (1980, 1982), Ph.D., Stanford University (1986)
Teaching: EVEN 1000 First-Year Seminar in Environ. Eng., CVEN 3424 Water and Wastewater Treatment
Research: Drinking Water Quality and Treatment, Disinfection By-Products, Natural Organic Matter
Email: r.summers@colorado.edu, phone: 303 492 6644, office: ECOT 540

Forms and Appendix

The forms listed below are available on the following pages:

- Special Option Course Selection Proposal
- Advising Evaluation Form
- Degree Requirements Worksheet
    - Environmental Engineering Bachelor of Science
    - Environmental Engineering/Chemical Engineering Dual Bachelor of Science
    - Environmental Engineering/Civil Engineering Dual Bachelor of Science
- Independent Study Agreement Form
- Table of Prerequisite and Co-requisite Courses for Required Courses in the EVEN BS Curriculum
- Table of Prerequisite and Co-requisite Courses for Option Courses in the EVEN BS Curriculum

Environmental Engineering Program
College of Engineering and Applied Science
University of Colorado at Boulder

Special Option Selection Proposal

Student Name: _____ Student number: _____

Class standing: Freshman Sophomore Junior Senior 5th Yr Senior
Degree Program: EVEN BS EVEN/CHEN Dual BS EVEN/CVEN Dual BS EVEN BS/CVEN MS
Option: Air Quality Applied Ecology Chemical Processing Water and Wastewater (Special)

Faculty Advisor Name: _____

Title for Area of Specialization for Special Option: _____

_____

Proposed Courses for Special Option:

1. _____ _____
   Course Number and Name Credits
2. _____ _____
3. _____ _____
4. _____ _____
5. _____ _____

Explanation of Need for Special Courses (i.e., difference from regular Options; importance for an Environmental Engineering education):

_____ _____
Student Signature Date Faculty Advisor Signature
Date

Received by Program Coordinator _____
Date

Director Approval: Approved Returned for Amendment Disapproved

Comments: _____

_____
Director Signature
Date

EVEN Advising Evaluation

EVEN Students: We are conducting this survey to get your opinions about EVEN academic advising. We will use your opinions to improve academic advising in the Environmental Engineering program. We need your participation in this process; therefore, *you must return this survey to get your registration flag lifted*. Return the completed survey to the Program Coordinator (Joan Hemm, ECOT 511).

Advisor's Name: _____ **Date:** _____/_____/_____

How was your advising experience? (Rate from 1 to 5 with 1 being poor and 5 being excellent.)

1	2	3	4	5
Poor				Excellent

Explain your numeric evaluation:

_____

_____

How could we improve the advising process?

_____

_____

Did you have any problem scheduling courses that you need to graduate? If so, which courses?

_____

_____

Is your advisor knowledgeable about your career interests or option track in Environmental Engineering? If not, have you sought out other EVEN faculty for advice?

_____

_____

Please circle your status:

Freshman Sophomore Junior Senior Senior 5

Please circle your option track (juniors and seniors only):

Air Quality Applied Ecology Chemical Processing Special Water/Wastewater

Degree Requirements Worksheet – EVEN BS Degree

Student Name: _____ Student#:_____

Faculty Advisor: _____

Required Courses

course no.	course name	credits	course taken	grade	term
Engineering (52 hours)					
GEEN 1300	Intro to Engineering Computing	3	_____	_____	_____
EVEN 1000	1st Year Seminar Environmental Engr	1	_____	_____	_____
GEEN 1400	Engineering Projects	3	_____	_____	_____
CHEN 2120	Chem Engr Matl Energy Balances	3	_____	_____	_____
a	Solid Mechanics	3	_____	_____	_____
CVEN 3414	Introduction to Environmental Engr	3	_____	_____	_____
b	Probability and Statistics	3	_____	_____	_____
c	Fluid Mechanics	3	_____	_____	_____
d	Thermodynamics	3	_____	_____	_____
e	Heat Transfer	3	_____	_____	_____
CHEN 3220	Chem Engr Separatn & Mass Transfer	3	_____	_____	_____
CVEN 3454	Water Quality	4	_____	_____	_____
f	Numerical Methods	3	_____	_____	_____
CVEN 4484	Environmental Microbiology	3	_____	_____	_____
CVEN 4434	Environmental Engineering Design	3	_____	_____	_____
MCEN 4131	Air Pollution Control	3	_____	_____	_____
CVEN 4333	Hydrology	3	_____	_____	_____
		[ ]	Engineering Total (**51**)		
Mathematics (16 hours)					
APPM 1350	Calculus 1 for Engineers	4	_____	_____	_____
APPM 1360	Calculus 2 for Engineers	4	_____	_____	_____
APPM 2350	Calculus 3 for Engineers	4	_____	_____	_____
APPM 2360	Intro Diff Eqns & Linear Algebra	4	_____	_____	_____
		[ ]	Mathematics Total (**16**)		
Sciences (22 hours)					
CHEM 1211	General Chemistry	3	_____	_____	_____
CHEN 1221	General Chemistry Laboratory	2	_____	_____	_____
PHYS 1110	General Physics 1	4	_____	_____	_____
PHYS 1120	General Physics 2	4	_____	_____	_____
PHYS 1140	Experimental Physics 2	1	_____	_____	_____
CHEM 4511	Physical Chemistry 1	3	_____	_____	_____
CHEM 3311	Organic Chemistry 1	4	_____	_____	_____
CHEM 3321	Laboratory in Organic Chemistry 1	1	_____	_____	_____
		[ ]	Sciences Total (**22**)		

Elective Courses

course no.	course name	credits	course taken	grade	term
Humanities & Social Sciences Electives (18 hours, 6 hours upper division)					
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
g	Required Communication Course				
	H&SS (upper division)				
			H&SS Total (**18**)		
Option Courses (12 hours)					
h	Option 1				
	Option 2				
	Option 3				
	Option 4				
			Option Total (**12**)		
Technical Electives (9 hours, 6 hours upper division)					
	Tech (lower or upper division)				
	Tech (upper division)				
	Tech (upper division)				
			Technical Elective Total (**9**)		
Free Elective (1 hour, upper division; add to H&SS Electives, Option Courses, or Technical Electives)					
	Free (upper division)				
			Free Elective Total (**1**)		

Credit hour Grand Total:		**Grade Point Average:**	
(128)			
Preliminary Check:		**Date:**	
Final Check:		**Date:**	

a Solid Mechanics options: CVEN 2121 Analytical Mechanics, MCEN 2023 Statics and Structures

b Probability & Statistics options: CHEN 3010 Applied Data Analysis, CVEN 3227 Probability, Statistics, & Decisions

c Fluid Mechanics options: CHEN 3200 Chemical Engineering Fluid Mechanics, CVEN 3313 Fluid Mechanics, MCEN 3021 Fluid Mechanics

d Thermodynamics options: CHEN 3320 Chemical Engineering Thermodynamics, MCEN 3012 Thermodynamics

e Heat Transfer options: CHEN 3210 Chemical Engineering Heat Transfer, MCEN 3022 Heat Transfer

f Numerical Methods: APPM 4650 Intermediate Numerical Analysis 1, CHEN 4580 Numerical Methods for Process Simulation, MCEN 4030 Computational Methods

g WRTG 3030 Writing on Science and Society, Herbst 3100/3200, or another approved course

h Consult *Degree Guidelines* for lists of Option courses

Degree Requirements Worksheet – EVEN BS/CHEN BS Dual Degree

Student Name: _____ Student#:_____

Faculty Advisor: _____

Required Courses

course no.	course name	credits	course taken	grade	term
Engineering (74 hours)					
GEEN 1300	Intro to Engineering Computing	3	_____	_____	_____
EVEN 1000	1st Year Seminar Environmental Engr	1	_____	_____	_____
GEEN 1400	Engineering Projects	3	_____	_____	_____
CHEN 1300	Introduction to Chemical Engineering	1	_____	_____	_____
CHEN 2120	Chem Engr Matl Energy Balances	3	_____	_____	_____
CHEN 3200	Chem Engr Fluid Mechanics	3	_____	_____	_____
CHEN 3010	Applied Data Analysis	3	_____	_____	_____
CHEN 3210	Chem Engr Heat Transfer	3	_____	_____	_____
CHEN 3320	Chem Engr Thermodynamics	3	_____	_____	_____
CVEN 3414	Introduction to Environmental Engr	3	_____	_____	_____
CHEN 3130	Chem Engr Laboratory 1	2	_____	_____	_____
CHEN 3220	Chem Engr Separatn & Mass Transfer	3	_____	_____	_____
CHEN 4330	Chem Engr Reaction Kinetics	3	_____	_____	_____
CVEN 3454	Water Chemistry	4	_____	_____	_____
CHEN 4090	Undergraduate Seminar	1	_____	_____	_____
CHEN 4130	Chem Engr Laboratory 2	2	_____	_____	_____
CHEN 4520	Chemical Process Synthesis	3	_____	_____	_____
CHEN 4580	Numer Methods For Process Simul	3	_____	_____	_____
a	Solid Mechanics	3			
CHEN 4440	Chemical Engineering Materials	3	_____	_____	_____
CHEN 4530	Chemical Engineering Design Project	2	_____	_____	_____
CHEN 4570	Instrumentation and Process Control	4	_____	_____	_____
CHEN 4670/ CHEN 4680	Environmental Separations Environmental Process Engineering	3	_____	_____	_____
CVEN 4333	Engineering Hydrology	3	_____	_____	_____
MCEN 4131	Air Pollution Control	3	_____	_____	_____
CVEN 4434	Environmental Engineering Design	3	_____	_____	_____
CVEN 4484	Environmental Microbiology	3	_____	_____	_____
		[ ]	Engineering Total (**74**)		
Mathematics (16 hours)					
APPM 1350	Calculus 1 for Engineers	4	_____	_____	_____
APPM 1360	Calculus 2 for Engineers	4	_____	_____	_____
APPM 2350	Calculus 3 for Engineers	4	_____	_____	_____
APPM 2360	Intro Diff Eqns & Linear Algebra	4	_____	_____	_____
		[ ]	Mathematics Total (**16**)		

Required Courses (continued)

course no.	course name	credits	course taken	grade	term
Sciences (29 hours)					
CHEM 1211	General Chemistry	3			
CHEN 1221	General Chemistry Laboratory	2			
PHYS 1110	General Physics 1	4			
PHYS 1120	General Physics 2	4			
PHYS 1140	Experimental Physics 2	1			
CHEM 3311	Organic Chemistry 1	4			
CHEM 3321	Laboratory in Organic Chemistry 1	1			
CHEM 3331	Organic Chemistry 2	4			
CHEM 3341	Laboratory in Organic Chemistry 2	1			
CHEM 4511	Physical Chemistry 1	3			
CHEM 4541	Laboratory in Physical Chemistry 1	2			
			Sciences Total (**29**)		

Elective Courses

course no.	course name	credits	course taken	grade	term
Humanities & Social Sciences Electives (18 hours, 6 hours upper division)					
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
b	Required Communication Course				
	H&SS (upper division)				
			H&SS Total (**18**)		
Chemistry and Technical Elective (6 hours, upper division)					
c	Chemistry				
	Tech (upper division)				
			Chemistry and Technical Total (**6**)		

Credit hour Grand Total: _____ **(143)**

Grade Point Average: _____

Preliminary Check: _____ **Date:** _____

Final Check: _____ **Date:** _____

a Solid Mechanics options: CVEN 2121 Analytical Mechanics, MCEN 2023 Statics and Structures

b WRTG 3030 Writing on Science and Society, Herbst 3100/3200, or another approved course

c Chemistry elective: upper division course from Chemistry and Biochemistry (CHEM)

Degree Requirements Worksheet – EVEN BS/CVEN BS Dual Degree

Student Name: _____ Student#:_____

Faculty Advisor: _____

Required Courses

course no.	course name	credits	course taken	grade	term
Engineering (87 hours)					
GEEN 1300	Intro to Engineering Computing	3			
EVEN 1000	1st Year Seminar Environmental Engr	1			
CVEN 1317	Introduction to Civil Engineering	1			
CVEN 2012	Plane Surveying	2			
CVEN 3698	Engineering Geology	3			
AREN 1017	Engineering Drawing	2			
CHEN 2120	Chem Engr Matl Energy Balances	3			
CVEN 2121	Analytical Mechanics 1	3			
CVEN 3161	Mechanics of Materials 1	3			
CVEN 3313	Theoretical Fluid Mechanics	3			
CVEN 3414	Introduction to Environmental Engr	3			
CHEN 3210	Chem Engr Heat Transfer	3			
CVEN 3323	Hydraulic Engineering	3			
CVEN 3525	Structural Engineering 1	3			
CHEN 3220	Chem Engr Separatn & Mass Transfer	3			
CVEN 3227	Probability, Statistics & Decisions	3			
CVEN 3424	Water and Wastewater Treatment	3			
CVEN 3454	Water Chemistry	4			
CVEN 3246	Introduction to Construction	3			
CVEN 3708	Geotechnical Engineering 1	3			
CVEN 4039	Senior Seminar	1			
a	Thermodynamics	3			
b	Numerical Methods	3			
CVEN 4333	Engineering Hydrology	3			
CVEN 4423	Water Resources Engineering Design	3			
CVEN 4474	Hazard Industrial Waste Management	3			
MCEN 4131	Air Pollution Control	3			
CVEN 3256	Construction Equipment & Methods	3			
CVEN 4147	Engineering Economics	3			
CVEN 4434	Environmental Engineering Design	3			
CVEN 4484	Environmental Microbiology	3			
		[ ]	Engineering Total (**86**)		
Mathematics (16 hours)					
APPM 1350	Calculus 1 for Engineers	4			
APPM 1360	Calculus 2 for Engineers	4			
APPM 2350	Calculus 3 for Engineers	4			
APPM 2360	Intro Diff Eqns & Linear Algebra	4			
		[ ]	Mathematics Total (**16**)		

Required Courses (continued)

course no.	course name	credits	course taken	grade	term
Sciences (22 hours)					
CHEM 1211	General Chemistry	3			
CHEN 1221	General Chemistry Laboratory	2			
PHYS 1110	General Physics 1	4			
PHYS 1120	General Physics 2	4			
PHYS 1140	Experimental Physics 2	1			
CHEM 3311	Organic Chemistry 1	4			
CHEM 3321	Laboratory in Organic Chemistry 1	1			
CHEM 4511	Physical Chemistry 1	3			
			Sciences Total (**22**)		

Elective Courses

course no.	course name	credits	course taken	grade	term
Humanities & Social Sciences Electives (18 hours, 6 hours upper division)					
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
c	Required Communication Course				
	H&SS (upper division)				
			H&SS Total (**18**)		
Free Elective (1 hour, upper division; add to H&SS Electives, Option Courses, or Technical Electives)					
	Free (upper division)				
			Free Elective Total (**1**)		

Credit hour Grand Total:		**Grade Point Average:**	
	(143)		
Preliminary Check:		**Date:**	
Final Check:		**Date:**	

a Thermodynamics options: CHEN 3320 Chemical Engineering Thermodynamics, MCEN 3012 Thermodynamics

b Numerical Methods: APPM 4650 Intermediate Numerical Analysis 1, CHEN 4580 Numerical Methods for Process Simulation, MCEN 4030 Computational Methods

c WRTG 3030 Writing on Science and Society, Herbst 3100/3200, or another approved course

Environmental Engineering Program
College of Engineering and Applied Science
University of Colorado at Boulder

Independent Study Proposal

Student Name: _____ Student number: _____

Class standing: Freshman Sophomore Junior Senior 5th Yr Senior
Degree Program: EVEN BS EVEN/CHEN Dual BS EVEN/CVEN Dual BS EVEN BS/CVEN MS
Option: Air Quality Applied Ecology Chemical Processing Water and Wastewater Special

Previous number of Independent Study hours earned for EVEN degree: _____
Previous number of Independent Study hours earned outside this major: _____

Collaborating Faculty Name: _____

Semester: _____ Credit hours (1-3): _____

Independent Study Title: _____

Work to be done:

Products required for successful completion:

_____ _____
Student Signature Date Collaborating Faculty Signature
Date

Received by Program Coordinator _____
Date

Director Approval: Approved Returned for Amendment Disapproved

Comments: _____

_____
Director Signature Date

Registered by Program Coordinator _____ Course Number: _____
Date

Table of Prerequisites and co-requisites for required courses in the EVEN BS curriculum.

course no.	course name	prerequisites	co-requisites
APPM 1350	Calculus 1 for Engineers	none	none
CHEM 1211	General Chemistry for Engineers	none	none
CHEN 1221	General Chemistry Laboratory	none	none
GEEN 1300	Intro to Engineering Computing	none	none
EVEN 1000	1st Year Seminar Environmental Engr	none	none
APPM 1360	Calculus 2 for Engineers	APPM 1350	none
PHYS 1110	General Physics 1	none	APPM 1350
GEEN 1400	Engineering Projects	none	none
APPM 2350	Calculus 3 for Engineers	APPM 1360	none
PHYS 1120	General Physics 2	PHYS 1110	APPM 1350
PHYS 1140	Experimental Physics 1	PHYS 1110	PHYS 1120
CHEN 2120	Chem Engr Matl Energy Balances	CHEM 1211	GEEN 1300
APPM 2360	Intro Diff Eqns & Linear Algebra	APPM 2350	none
CHEM 4511	Physical Chemistry 1	*CHEM 3311, APPM 2350, PHYS 1110	PHYS 1120
CVEN 2121	Analytical Mechanics 1	PHYS 1110	APPM 2350
MCEN 2023	Statics and Structures	APPM 1360	none
CVEN 3414	Introduction to Environmental Engr	CHEM 1211, CHEN 1221, APPM 2350	none
CHEM 3311	Organic Chemistry 1	CHEM 1211	none
CHEM 3321	Laboratory in Organic Chemistry 1	CHEM 1211	CHEM 3311
CHEN 3010	Applied Data Analysis	GEEN 1300, APPM 2360	none
CVEN 3227	Probability, Statistics & Decisions	APPM 2360	none
CHEN 3200	Chem Engr Fluid Mechanics	APPM 2360, CHEN 2120, GEEN 1300	none
CVEN 3313	Theoretical Fluid Mechanics	CVEN 2121, MCEN 2023	none
MCEN 3021	Fluid Mechanics	APPM 2360, Solid Mechanics	none
CHEN 3320	Chem Engr Thermodynamics	CHEM 4511	none
MCEN 3012	Thermodynamics	APPM 2350	none
CHEN 3210	Chem Engr Heat Transfer	CHEN 3200	none
MCEN 3022	Heat Transfer	MCEN 3012, Fluid Mechanics	none
CHEN 3220	Chem Engr Separatn & Mass Transfer	CHEN 3200	CHEN 3210, MCEN 3022
CVEN 3454	Water Quality	CVEN 3414	none
CHEN 4580	Numerical Methods Process Simulatn	CHEN 3210, CHEN 3220	none
MCEN 4030	Computational Methods	GEEN 1300, APPM 2360	none
CVEN 4434	Environmental Engineering Design	*CVEN 3424, CVEN 3454	none
CVEN 4484	Environmental Microbiology	CHEM 1211, CHEN 1221, APPM 2350	none
MCEN 4131	Air Pollution Control	Fluid Mechanics	none
CVEN 4333	Engineering Hydrology	Statistics, CVEN 3323	none

*or by instructor's consent as arranged by the Environmental Engineering Program

Table of Prerequisites and co-requisites for Option courses in the EVEN BS curriculum.

course no.	course name	prerequisites	co-requisites
Air Quality Option			
ATOC 3500	Air Chemistry and Pollution	CHEM 1211	none
ATOC 4710	Atmospheric Physics	APPM 1360, PHYS 1120	none
MCEN 3042	Thermal Systems Design	Thermodynamics, Heat Transfer	none
CHEM 4541	Physical Chemistry Laboratory	CHEM 4511	none
MCEN 4141	Indoor Air Pollution	Fluid Mechanics, Heat Transfer	none
MCEN 4152	Introduction to Combustion	Thermodynamics, Fluid Mechanics, Heat Transfer	none
MCEN 4162	Energy Conversion	Thermodynamics	none
EVEN 4830	Sp Top – Envir Satellite Remote Sensing	instructor consent	none
Applied Ecology Option			
CVEN 3434	Introduction to Applied Ecology	CHEN 1221, PHYS 1110, PHYS 1140	none
EPOB 2070	Genetics: Molecules to Populations	EPOB 1210-1240 or EPOB 2050, EPOB 2060	none
EPOB 2080	Evolutionary Biology	EPOB 2050-2070	
EPOB 4030	Limnology	EPOB 2050, EPOB 2060 or EPOB 3020	none
EVEN 4830	Sp Top – Envir Satellite Remote Sensing	instructor consent	none
Chemical Processing Option			
CHEN 4330	Chem Engr Reaction Kinetics	CHEN 2120, CHEN 3320	CHEN 3210
CHEM 3331	Organic Chemistry 2	CHEM 3311	none
CHEN 3130	Chemical Engineering Laboratory 1	CHEN 3010, CHEN 3210	CHEN 3320
CHEN 4130	Chemical Engineering Laboratory 2	CHEN 3130, CHEN 3220	CHEN 4330
CHEN 4670	Environmental Separations	CHEN 2120	none
CHEN 4680	Environmental Process Engineering	none	none
Water and Wastewater Option			
CVEN 3323	Hydraulic Engineering	CVEN 3313	none
CVEN 3424	Water and Wastewater Treatment	CVEN 3414	none
CVEN 4353	Groundwater Engineering	CVEN 3313	none
CVEN 4423	Water Resources Engr Design	Statistics, *CVEN 4147	none
CVEN 4474	Hazard Industrial Waste Management	CVEN 3414, *CVEN 3424	none

*or by instructor's consent as arranged by the Environmental Engineering Program