

UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: Paul T. Imhoff phone number: 831-0541

Department: Civil and Environmental Engineering email address: imhoff@del.edu

Action: change in curriculum for Bachelor of Science in Environmental Engineering
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 08F
(use format 04F, 05W)

Current degree Bachelor of Environmental Engineering
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: Bachelor of Environmental Engineering
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: name of major and names of all concentrations remain the same – no proposed changes
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

Revising or Deleting:

Undergraduate major / Concentration: Environmental Engineering/ Environmental Facilities Design and Construction; Environmental Engineering/ Contaminant Transport and Control Processes; Environmental Engineering/ Environmental Engineering Biotechnology Environmental Engineering/ Water Resources and Water Quality
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: _____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: _____
(**Must attach** your Graduate Program Policy Statement)

Graduate Program of Study: _____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: _____

Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.

List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter “None”)

None

Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education: <http://www.ugs.udel.edu/gened/>

The proposed changes to the environmental engineering curriculum involve the addition of two existing classes: CISC 106 General Computer Science for Engineers and EGGG 101 Introduction to Engineering. Adding these courses allows a common first semester for all freshmen engineering students in the College of Engineering.

CISC 106 will advance Goal 1 of undergraduate education through formal instruction in computer programming. A course in computer science was not previously required for students in the major. EGGG 101 replaces the 1-credit CIEG 135 Introduction to Environmental Engineering. EGGG 101 is much broader in scope and will expose students to all branches of engineering. This new course supports Goals 3 and 5 of undergraduate education: students will work collaboratively on class projects with students pursuing other engineering degrees, and students will also be exposed to a wider range of engineering topics. For example, EGGG 101 includes Sustainable Engineering, a topic that was not included in CIEG 135.

Identify other units affected by the proposed changes:

(Attach permission from the affected units. If no other unit is affected, enter “None”)

The only other unit directly affected will be Computer Science, as environmental engineering students will be directed to take CISC 106. Because several different units within the College of Engineering will be sending students to take this course, permission to handle the increased enrollment in this course is being sought by others in the College of Engineering.

Describe the rationale for the proposed program change(s):

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

The reasons for the proposed program changes are described in the attached memo to Keith Goossen, Chair, Educational Activities Committee.

Program Requirements:

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

The proposed revised curriculum is shown in the attachment to the memo to Keith Goossen, Chair, Educational Activities Committee. Course changes and credit hour changes are noted in **BOLD**.

A side-by-side comparison between the old and proposed curriculum is best presented by the second attachment to this document, which is the old curriculum that has been marked up using “tracking changes” to reflect the proposed changes.

ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson _____ Date _____

Dean of College _____ Date _____

Chairperson, College Curriculum Committee _____ Date _____

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

Vice Provost for Academic Programs & Planning _____ Date _____

Provost _____ Date _____

Board of Trustee Notification _____ Date _____

Revised 5/02/06 /khs

Memorandum



October 30, 2007

TO: Keith Goossen, Chair, Educational Activities Committee

FROM: Paul T. Imhoff, Dept. Of Civil and Environmental Engineering

RE: Proposed revisions to Bachelor's Degree in Environmental Engineering

The Department of Civil and Environmental Engineering wishes to propose the following revisions to the Bachelor's Degree in Environmental Engineering:

- 1. Add EGGG 101 to all Concentrations to replace CIEG 135:** Add Introduction to Engineering (EGGG 101) to replace Introduction to Environmental Engineering (CIEG 135) for all Concentrations for a Bachelor's Degree in Environmental Engineering.
- 2. Add CISC 106 to all Concentrations:** Add General Computer Science for Engineers (CISC 106) to all Concentrations for a Bachelor's Degree in Environmental Engineering.
- 3. Remove CIEG 212 and CIEG 213 from three Concentrations:** Remove Solid Mechanics (CIEG 212) and Civil Engineering Materials Laboratory (CIEG 213) from three of the four concentrations in environmental engineering: Contaminant Transport and Control Processes, Environmental Engineering Biotechnology, and Water Resources and Water Quality.
- 4. Remove four credits of technical elective from the Concentration in Environmental Facilities Design and Construction.**
- 5. Move CHEM 119 and general elective courses between semesters:** Move Quantitative Chemistry I (CHEM 119) from the fall semester of the freshman year to fall semester of the sophomore year for students concentrating in Contaminant Transport and Control Processes. Move general elective courses as necessary to balance the credit load among all semesters for this and the other three Concentrations.

These proposed changes stem from careful assessment of our existing curriculum in light of the College of Engineering's decision to establish a common first semester. Below are presented the justifications for the revisions summarized above. Appended to this document is the complete tabulation of the curriculum as it should appear with the enactment of these revisions.

1. Add EGGG 101 to all concentration to replace CIEG 135.

Introduction to Engineering EGGG 101 (2-credits) is a new course that introduces entering freshmen to all engineering disciplines. In order to have a common first semester, it is necessary to replace our existing Introduction to Environmental Engineering CIEG 135 (1-credit) with this course. EGGG 101 includes three lectures on environmental engineering.

2. Add CISC 106 to all concentrations.

General Computer Science for Engineers CISC 106 (3-credits) is a relatively new course that introduces students to Matlab and C programming. Currently, students in environmental engineering are not required to take an entire course in computer programming. This has led to piecemeal approaches to the use of computer tools in our engineering courses, with students using MathCAD, Visual Basic, or Matlab depending on instructor preference. Requiring students to take a common programming course will allow more instructional time on primary course materials in subsequent engineering courses. A secondary motivation for adding CISC 106 is to create a common first semester for all freshmen engineering students.

It is our understanding that the College of Engineering is working with the Department of Computer Science to ensure that enough seats are available for all entering freshmen to take CISC 106 beginning fall 2008.

3. Remove CIEG 212 and CIEG 213 from three concentrations.

Solid Mechanics CIEG 212 (3-credits) and Civil Engineering Materials Laboratory CIEG 213 (1-credit) are a two-course sequence currently taken by all civil and environmental engineering students in the sophomore year. In the pre-2006 curriculum, these courses were required of all environmental engineering students, since including them would permit students the option of selecting the Environmental Facilities Design and Construction area of concentration. (Areas of concentration were selected at the beginning of the Junior year in the pre-2006 curriculum.) CIEG 212 and CIEG 213 are important courses for students who desire to gain expertise in the design and construction of environmental engineering facilities.

Beginning in fall 2006 the old areas of concentration were eliminated and in their place four different Concentrations in environmental engineering were established. Concentrations are selected by freshmen when they enter the program. For this reason it is no longer necessary for all students in environmental engineering to take CIEG 212 and CIEG 213 – only those students who select the Concentration in Environmental Facilities Design and Construction. For this reason, we request that these two courses be removed from the remaining three Concentrations: Contaminant Transport and Control Processes, Environmental Engineering Biotechnology, and Water Resources and Water Quality.

5. Remove four credits of technical elective from the Concentration in Environmental Facilities Design and Construction.

The Concentration in Environmental Facilities and Design will include CIEG 212 and CIEG 213 and the new additions of CISC 106 and EGGG 101. We believe CISC 106 will allow more technical content in upper level engineering courses, since it will no longer be necessary to include the teaching of computer programming within these courses. In light of this and our desire to maintain the curriculum for all concentrations at 125 credit hours, we propose that the total number of technical electives for this concentration be reduced by four credits. Students will now be required to take a minimum of nine credits of technical electives for this Concentration.

6. Move CHEM 119 and general elective courses between semesters.

In order to make room in the curriculum for CISC 106 in the fall semester of the freshman year, it is necessary to move Quantitative Chemistry I CHEM 119 (3-credits) from fall semester freshman year to fall semester sophomore year for students concentrating in Contaminant Transport and Control Processes. For students selecting other Concentrations, it is necessary to move the required three credits of general elective in the fall semester of the freshman year to another semester. The change in CHEM 119 will not affect other courses in our curriculum, since this course is not a pre-requisite for any other required course. Moving CHEM 119 from the fall semester of the freshman year to the fall semester of the sophomore year will also have no long-term effect on enrollment in this course. Changes in the timing of general electives will not affect our curriculum or other programs on campus.

Degree: Bachelor of Environmental Engineering
Major: Environmental Engineering
Concentration: Contaminant Transport and Control Processes

FRESHMAN YEAR

	Cr.
MATH 241 Calculus A	4
CHEM 111 General Chemistry I	3
CISC 106 Computer Science	3
EGGG 101 Intro. to Engineering	2
ENGL 110 Critical Reading & Writing	3
	15

	Cr.
MATH 242 Calculus B	4
CHEM 112 General Chemistry II	3
PHYS 207 General Physics I	4
Breadth Requirement	3
Breadth Requirement	3
	17

SOPHOMORE YEAR

	Cr.
MATH 243 Calculus C	4
CIEG 211 Statics	3
CIEG 233 Env. Engineering Processes	3
ENGL 410 Technical Writing	3
CHEM 119 Quantitative Chemistry I	3
	16

	Cr.
MATH 302 Differential Equations	3
BISC 302 General Ecology	3
CIEG 126 CAD, GIS, Surveying	3
Breadth Requirement	3
Breadth Requirement	3
	15

JUNIOR YEAR

	Cr.
CIEG 305 Fluid Mechanics	3
CHEG 231 Thermodynamics I	3
CIEG 438 Water & WW Engineering ^a	3
CIEG 440 Water Resources Eng. I	3
CHEM 443 Physical Chemistry I	3
	15

	Cr.
CIEG 337 Environmental Engg Lab ^b	3
CIEG 306 Fluid Mechanics Lab	1
CIEG 315 Prob. & Stats. for Engineers	3
CHEG 325 Thermodynamics II	3
Breadth Requirement	3
Breadth Requirement	3
	16

SENIOR YEAR

	Cr.
CIEG 436 PRM of Solid Wastes ^b	3
CIEG 461 Senior Design	2
CHEG 332 Chemical Engg Kinetics	3
Technical & Earth Science Elective	3
Technical Elective	3
Technical Elective	3
	17

	Cr.
CIEG 437 Water Quality Lab ^a	3
CIEG 461 Senior Design	2
CIEG 434 Air Pollution Control	3
CHEG 342 Heat and Mass Transfer	3
Technical Elective	3
	14

Several Junior and Senior level courses are taught on alternate years:

^a – taught in even year

^b – taught in odd year

Degree: Bachelor of Environmental Engineering
Major: Environmental Engineering
Concentration: Environmental Facilities Design and Construction

FRESHMAN YEAR

	Cr.
MATH 241 Calculus A	4
CHEM 103 General Chemistry	4
CISC 106 Computer Science	3
EGGG 101 Intro. to Engineering	2
ENGL 110 Critical Reading & Writing	3
	16

	Cr.
MATH 242 Calculus B	4
CHEM 104 General Chemistry	4
PHYS 207 General Physics I	4
Breadth Requirement	3
	15

SOPHOMORE YEAR

	Cr.
MATH 243 Calculus C	4
CIEG 211 Statics	3
CIEG 233 Env. Engineering Processes	3
ENGL 410 Technical Writing	3
Breadth Requirement	3
	16

	Cr.
MATH 302 Differential Equations	3
CIEG 212 Solid Mechanics	3
CIEG 213 Solid Mechanics Lab	1
BISC 302 General Ecology	3
CIEG 126 CAD, GIS, Surveying	3
Breadth Requirement	3
	16

JUNIOR YEAR

	Cr.
CIEG 305 Fluid Mechanics	3
CHEG 231 Thermodynamics I	3
CIEG 438 Water & WW Engineering ^a	3
CIEG 301 Structural Analysis	4
Breadth Requirement	3
	16

	Cr.
CIEG 337 Environmental Eng'g Lab ^b	3
CIEG 306 Fluid Mechanics Lab	1
CIEG 315 Prob. & Stats. for Engineers	3
CIEG 302 Structural Design	4
Breadth Requirement	3
	14

SENIOR YEAR

	Cr.
CIEG 436 PRM of Solid Wastes ^b	3
CIEG 461 Senior Design	2
CIEG 440 Water Resources Eng. I	3
CIEG 320 Soil Mechanics	3
CIEG 323 Soil Mechanics Lab	1
Breadth Requirement	3
	15

	Cr.
CIEG 437 Water Quality Lab ^a	3
CIEG 461 Senior Design	2
CIEG 434 Air Pollution Control	3
Technical Elective	3
Technical Elective	3
Technical & Earth Science Elective	3
	17

Several Junior and Senior level courses are taught on alternate years:

^a – taught in even year

^b – taught in odd year

Degree: Bachelor of Environmental Engineering
Major: Environmental Engineering
Concentration: Environmental Engineering Biotechnology

FRESHMAN YEAR

	Cr.
MATH 241 Calculus A	4
CHEM 103 General Chemistry	4
CISC 106 Computer Science	3
EGGG 101 Intro. to Engineering	2
ENGL 110 Critical Reading & Writing	3
	16

	Cr.
MATH 242 Calculus B	4
CHEM 104 General Chemistry	4
PHYS 207 General Physics I	4
Breadth Requirement	3
	15

SOPHOMORE YEAR

	Cr.
MATH 243 Calculus C	4
CIEG 211 Statics	3
CIEG 233 Env. Engineering Processes	3
ENGL 410 Technical Writing	3
Breadth Requirement	3
	16

	Cr.
MATH 302 Differential Equations	3
BISC 302 General Ecology	3
CIEG 126 CAD, GIS, Surveying	3
Breadth Requirement	3
Breadth Requirement	3
	15

JUNIOR YEAR

	Cr.
CIEG 305 Fluid Mechanics	3
CHEG 231 Thermodynamics I	3
CIEG 438 Water & WW Engineering ^a	3
CHEM 331 Organic Chemistry	3
CHEM 333 Organic Chemistry Lab	1
Breadth Requirement	3
	16

	Cr.
CIEG 337 Environmental Eng'g Lab ^b	3
CIEG 306 Fluid Mechanics Lab	1
CIEG 315 Prob. & Stats. for Engineers	3
PLSC 319 Environmental Soil Microbiology (Earth Science)	3
Technical Elective	3
Breadth Requirement	3
	16

SENIOR YEAR

	Cr.
CIEG 436 PRM of Solid Wastes ^b	3
CIEG 461 Senior Design	2
BISC 300 Intro. to Microbiology	4
CIEG 440 Water Resources Eng. I	3
Technical Elective	3
	15

	Cr.
CIEG 437 Water Quality Lab ^a	3
CIEG 461 Senior Design	2
CIEG 434 Air Pollution Control	3
CHEM 342 Intro. to Biochemistry	3
Technical Elective (Engineering)	3
Technical Elective	2
	16

Several Junior and Senior level courses are taught on alternate years:

^a – taught in even year

^b – taught in odd year

Degree: Bachelor of Environmental Engineering
Major: Environmental Engineering
Concentration: Water Resources and Water Quality

FRESHMAN YEAR

	Cr.
MATH 241 Calculus A	4
CHEM 103 General Chemistry	4
CISC 106 Computer Science	3
EGGG 101 Intro. to Engineering	2
ENGL 110 Critical Reading & Writing	3
	16

	Cr.
MATH 242 Calculus B	4
CHEM 104 General Chemistry	4
PHYS 207 General Physics I	4
Breadth Requirement	3
	15

SOPHOMORE YEAR

	Cr.
MATH 243 Calculus C	4
CIEG 211 Statics	3
CIEG 233 Env. Engineering Processes	3
ENGL 410 Technical Writing	3
Breadth Requirement	3
	16

	Cr.
MATH 302 Differential Equations	3
BISC 302 General Ecology	3
CIEG 126 CAD, GIS, Surveying	3
Breadth Requirement	3
Breadth Requirement	3
	15

JUNIOR YEAR

	Cr.
CIEG 305 Fluid Mechanics	3
CHEG 231 Thermodynamics I	3
CIEG 438 Water & WW Engineering ^a	3
CIEG 440 Water Resources Eng. I	3
Breadth Requirement	3
	15

	Cr.
CIEG 337 Environmental Eng'g Lab ^b	3
CIEG 306 Fluid Mechanics Lab	1
CIEG 315 Prob. & Stats. for Engineers	3
Technical Elective	3
Technical Elective	3
Breadth Requirement	3
	16

SENIOR YEAR

	Cr.
CIEG 436 PRM of Solid Wastes ^b	3
CIEG 461 Senior Design	2
EGTE 321 Storm Water Management	4
CIEG 468 Principles of Water Quality Criteria ^a	3
Technical Elective	3
	15

	Cr.
CIEG 437 Water Quality Lab ^a	3
CIEG 461 Senior Design	2
CIEG 434 Air Pollution Control	3
CIEG 498 Groundwater Flow and Contaminant Transport (Earth Sci.)	3
CIEG 430 Water Quality Modeling	3
Technical Elective	3
	17

Several Junior and Senior level courses are taught on alternate years:

^a – taught in even year

^b – taught in odd year

UNIVERSITY, COLLEGE, AND MAJOR REQUIREMENTS FOR ALL ENVIRONMENTAL ENGINEERING BACHELORS DEGREE CONCENTRATIONS						
UNIVERSITY REQUIREMENTS						
ENGL	110	Critical Reading and Writing (minimum grade C-)	3	^{1F}		
COLLEGE REQUIREMENTS						
Breadth Requirements				18	¹⁻⁴	
See p. 180: College Breadth Requirements. One of these courses must fulfill the University multi-cultural requirement (see p. 62-65).						
MAJOR REQUIREMENTS						
Core Courses for the Major:						
EGGG	101	Introduction to Engineering	2	^{1F}		
CISC	106	General Computer Science for Engineers	3	^{1F}		
ENGL	410	Technical Writing	3	^{2F}		
MATH	241	Analytic Geometry and Calculus A	4	^{1F}		
MATH	242	Analytic Geometry and Calculus B	4	^{1S}		
MATH	243	Analytic Geometry and Calculus C	4	^{2F}		
MATH	302	Ordinary Differential Equations	3	^{2S}		
PHYS	207	Fundamentals of Physics I	4	^{1S}		
BISC	302	Environmental Biology	3	^{2S}		
CHEG	231	Chemical Engineering Thermodynamics	3	^{3F}		
CIEG	126	CAD, GIS, Surveying	3	^{2S}		
CIEG	211	Statics	3	^{2F}		
CIEG	233	Environmental Engineering Processes	3	^{2F}		
CIEG	305	Fluid Mechanics	3	^{3F}		
CIEG	306	Fluid Mechanics Laboratory	1	^{3S}		
CIEG	315	Probability and Statistics for Engineers	3	^{3S}		
CIEG	337	Environmental Engineering Laboratory	3	^{3S}		
CIEG	434	Air Pollution Control	3	^{4S}		
CIEG	436	Solid Waste Management	3	^{4S}		
CIEG	437	Water & Wastewater Quality	3	^{4S}		
CIEG	438	Water and Wastewater Engineering	3	^{3F}		
CIEG	440	Water Resources Engineering	3	^{4F}		
CIEG	461	Senior Design Project	2	^{4F}		
CIEG	461	Senior Design Project	2	^{4S}		

Beyond these core courses, a Concentration must also be chosen. The Concentration determines which chemistry sequence is needed and which technical courses should be taken as a core group. For the chemistry courses, entering students are advised to take the CHEM 111/112/119, but CHEM 103/104 is acceptable for most concentrations.								
The technical courses are intended to provide the desired focus at the intermediate and advanced levels. Beyond the set of specific core technical courses for the Concentration, the remaining technical electives can then be chosen to further pursue this direction of study, or to provide a more diversified environmental engineering education. All technical electives must be upper level courses in engineering, the sciences, computer science, or mathematics.								
Students are initially admitted to Environmental Engineering in the Concentration "Contaminant Transport and Control Processes," since the sequence of courses in this Concentration allows students to change to any other Concentration following the freshman year. Students may choose a different Concentration at any time with the approval of their advisor, but changes should be made during the sophomore year to avoid scheduling conflicts and to insure that prerequisite courses are taken. The chemistry courses and the core technical courses are listed below for each Concentration.								
CREDITS TO TOTAL A MINIMUM OF							125	
DEGREE: BACHELOR OF ENVIRONMENTAL ENGINEERING								
MAJOR: ENVIRONMENTAL ENGINEERING								
CONCENTRATION: CONTAMINANT TRANSPORT AND CONTROL PROCESSES								
Physical and chemical processes for pollutant transport and remediation. Students should select this concentration as soon as possible in the curriculum.								
CURRICULUM							CREDITS	
See text above for University and College requirements.								
CHEM	111	General Chemistry †				3	¹ F	
CHEM	112	General Chemistry †				3	¹ S	
CHEM	119	Quantitative Chemistry I †				3	² F	
CHEG	325	Chemical Engineering Thermodynamics				3	³ S	
CHEG	332	Chemical Engineering Kinetics				3	⁴ F	
CHEG	342	Heat and Mass Transfer				3	⁴ S	
CHEM	443	Physical Chemistry I				3	³ F	
Additional technical electives, incl. 3 cr. Earth Science*						12		
† The alternative coursework CHEM 103/104/220 is also acceptable. Students taking CHEM 103 in fall semester freshman year can continue with CHEM 112/CHEM 119.								
* Advisor should be consulted to assure that Earth Science requirement is met through an appropriate technical elective.								

DEGREE:	BACHELOR OF ENVIRONMENTAL ENGINEERING								
MAJOR:	ENVIRONMENTAL ENGINEERING								
CONCENTRATION: ENVIRONMENTAL FACILITIES DESIGN AND CONSTRUCTION									
Engineering and constructing the systems for air, water, and wastewater purification. Students should select this concentration before enrolling for second-year courses.									
CURRICULUM				CREDITS					
See text above for University and College requirements.									
CHEM	103	General Chemistry					4	1F	
CHEM	104	General Chemistry					4	1S	
CIEG	212	Solid Mechancis					3	2S	
CIEG	213	Civil Engineering Materials Laboratory					1	2S	
CIEG	301	Structural Analysis					4	3F	
CIEG	302	Structural Design					4	3S	
CIEG	320	Soil Mechanics					3	4F	
CIEG	323	Soil Mechanics Laboratory					1	4F	
Additional technical electives, incl. 3 cr. Earth Science*							12		
* Advisor should be consulted to assure that Earth Science requirement is met through an appropriate technical elective.									
DEGREE: BACHELOR OF ENVIRONMENTAL ENGINEERING									
MAJOR: ENVIRONMENTAL ENGINEERING									
CONCENTRATION: ENVIRONMENTAL BIOTECHNOLOGY									
Biological and microbial aspects of contaminant behavior in natural and engineered systems. Students should select this concentration before enrolling for second-year courses.									
CURRICULUM				CREDITS					
See text above for University and College requirements.									
CHEM	103	General Chemistry					4	1F	
CHEM	104	General Chemistry					4	1S	
CHEM	331	Organic Chemistry					3	3F	
CHEM	333	Organic Chemistry Lab					1	3F	
PLSC	319	Environmental Soil Microbiology					4	3S	
BISC	300	Introduction to Microbiology					4	4F	
CHEM	342	Introduction to Biochemistry					3	4S	
Additional technical electives incl. 3 cr. Engg topics*							11		
* Advisor should be consulted to assure that Engg Topic requirement is met.									

DEGREE:	BACHELOR OF ENVIRONMENTAL ENGINEERING								
MAJOR:	ENVIRONMENTAL ENGINEERING								
CONCENTRATION: WATER RESOURCES AND WATER QUALITY									
Technical issues associated with providing, maintaining, and improving the supply and quality of surface and groundwaters.									
Students should select this concentration before enrolling for second-year courses.									
CURRICULUM					CREDITS				
See text above for University and College requirements.									
CHEM	103	General Chemistry			4	^{1F}			
CHEM	104	General Chemistry			4	^{1S}			
EGTE	321	Storm Water Management			4	^{4F}			
CIEG	468	Principles of Water Quality Criteria			3	^{4F}			
CIEG	498	Groundwater Flow and Contaminant Transport			3	^{4S}			
CIEG	430	Water Quality Modeling			3	^{4S}			
Additional technical electives					12				
<i>Additional Recommended Technical Electives</i>									
Students in any of the concentrations should consider the technical courses listed for other concentrations. In addition, the following courses qualify as technical electives.									
BISC	301	Molecular Biology of Cells							
BISC	311	Molecular Biology for Engineers							
BISC	641	Microbial Ecology							
CHEM	444	Physical Chemistry							
CIEG	321	Geotechnical Engineering							
CIEG	407	Building Design							
CIEG	433	Hazardous Waste Management							
CIEG	482	Systems Design and Operation							
CIEG	636	Engg							
GEOL	421	Environmental and Applied Geology							
GEOL	446	General Geochemistry							
MEEG	424	Air Pollution Processes							
MSEG	302	Materials Science							
PLSC	608	Soil Chemistry							
PLSC	619	Soil Microbiology							
Note: This list is not exhaustive. Consult your advisor, particularly if you intend to pursue graduate studies in environmental engineering or related fields.									

Name _____ **ENVIRONMENTAL ENGINEERING PROGRAM** Advisor _____

Contaminant Transport & Control Processes (125 Hours)

Transfer Credits _____ Effective for EG08 and subsequent classes

Eval. by _____ The required courses of the program are normally taught in Fall or Spring Semesters
Date _____ as indicated below. Each student is responsible for tracking future changes in this schedule.

FRESHMAN YEAR

FIRST TERM

15 credits

Analytical Geom. & Calc. A	MATH 241 (4)	*
General Chemistry I	CHEM 111 (3)	*
Computer Science	CISC 106 (3)	
Intro to Engineering	EGGG 101 (2)	
Critical Reading & Writing	ENGL 110 (3)	*

SECOND TERM

17 credits

Analytical Geom. & Calc. B	MATH 242 (4)	*
General Chemistry II	CHEM 112 (3)	*
General Physics I	PHYS 207 (4)	*
Breadth Requirement	(3)	
Breadth Requirement	(3)	

Deleted: Quantitative Chemistry I

Deleted: CHEM 119

Deleted: (3)

*Grade of "C-" or better required in these courses as degree requirement or as prerequisite for other courses.

SOPHOMORE YEAR

FIRST TERM

16 credits

Analytical Geom. & Calc. C	MATH 243 (4)	*
Technical Writing	ENGL 410 (3)	
Statics	CIEG 211 (3)	
Env. Engineering Processes	CIEG 233 (3)	*
Quantitative Chemistry I	CHEM 119 (3)	

SECOND TERM

15 credits

Differential Equations	MATH 302 (3)	
General Ecology	BJSC 302 (3)	
Breadth Requirement	(3)	
CAD, GIS, Surveying	CIEG 126 (3)	
Breadth Requirement	(3)	

Deleted: 16

Deleted: Solid Mechanics

Deleted: CIEG 212

Deleted: (3)

Deleted: CE Materials Lab

Deleted: CIEG 213

Deleted: (1)

Deleted: Breadth Requirement

Deleted: (3)

JUNIOR YEAR

FIRST TERM

15 credits

Thermodynamics I	CHEG 231 (3)	*
Fluid Mechanics	CIEG 305 (3)	
Water & WW Engineering ^a	CIEG 438 (3)	
Water Resources Eng.	CIEG 440 (3)	
Physical Chemistry I	CHEM 443 (3)	

SECOND TERM

16 credits

Env. Engineering Lab ^b	CIEG 337 (3)	
Fluid Mechanics Lab	CIEG 306 (1)	
Thermodynamics II	CHEG 325 (3)	
Prob. & Stats. for Engineers	CIEG 315 (3)	
Breadth Requirement	(3)	
Breadth Requirement	(3)	

SENIOR YEAR

FIRST TERM

17 credits

Senior Design	CIEG 461 (2)	
Solid Waste Mgt. ^b	CIEG 436 (3)	
Chemical Engg. Kinetics	CHEG 332 (3)	
Tech & Earth Science Elect.	(3)	
Technical Elective	(3)	
Technical Elective	(3)	

SECOND TERM

14 credits

Senior Design	CIEG 461 (2)	
Water Quality Lab ^a	CIEG 437 (3)	
Air Pollution Control	CIEG 434 (3)	
Heat & Mass Transfer	CHEG 342 (3)	
Technical Elective	(3)	

Deleted: 2

^a Course alternates: taught in even year; ^b Course alternates: taught in odd year.

BREADTH REQUIREMENTS (24 HOURS)

See General Education Handout distributed by the Dean's Office

Humanities	Social Sciences	Additional Humanities or Social Science courses	Required writing skills courses
(3)	(3)	(3)	ENGL 110 (3)
(3)	(3)	(3)	ENGL 410 (3)

OTHER GENERAL EDUCATION REQUIREMENTS

_____ General Education plan approved () _____ Course (3 credits for multicultural requirements)
 _____ 2 courses (6 credits) above introductory level _____ 2 courses (6 credits) in the same department or program
 _____ (course numbers) _____ (course numbers)

TECHNICAL ELECTIVES:

Course	Course

IMPORTANT NOTES:

Technical Elective requirements for Environmental Engineering are given on the reverse side of this sheet. More complete General Education requirements should be obtained from the faculty advisor. Additional details and up-to-date information are available from the office of the Chairperson. Students may arrange (with Faculty Advisor's approval) the sequence of these and other courses when prerequisites (if any) have been met. Number of credits per term may also be adjusted to individual needs.

SYMBOLS: Pre-registered () Course in Progress () Completed and Passed ()
 Not Required (N) Transfer Credit (T)

Name _____ **ENVIRONMENTAL ENGINEERING PROGRAM** Advisor _____

Transfer Credits **Environmental Facilities Design & Construction (125 Hours)**

Eval. by _____ Effective for EG07 and subsequent classes

The required courses of the program are normally taught in Fall or Spring Semesters as indicated below. Each student is responsible for *tracking* future changes in this schedule.

FRESHMAN YEAR

FIRST TERM

16 credits

SECOND TERM

15 credits

Analytical Geom. & Calc. A	MATH 241 (4)	*
General Chemistrv	CHEM 103 (4)	*
Intro to Engineering	EGGG101 (2)	
Critical Reading & Writing	ENGL 110 (3)	*
Computer Science	CISC 106 (3)	

Analytical Geom. & Calc. B	MATH 242 (4)	*
General Chemistrv	CHEM 104 (4)	*
General Physics I	PHYS 207 (4)	*
Breadth Requirement	(3)	

Deleted: Breadth Requirement

Deleted: (3)

*Grade of "C-" or better required in these courses as degree requirement or as prerequisite for other courses.

SOPHOMORE YEAR

FIRST TERM

16 credits

SECOND TERM

16 credits

Analytical Geom. & Calc. C	MATH 243 (4)	*
Technical Writing	ENGL 410 (3)	
Statics	CIEG 211 (3)	
Env. Engineering Processes	CIEG 233 (3)	*
Breadth Requirement	(3)	

Differential Equations	MATH 302 (3)	
General Ecology	BISC 302 (3)	
Solid Mechanics	CIEG 212 (3)	
CE Materials Lab	CIEG 213 (1)	
CAD, GIS, Surveying	CIEG 126 (3)	
Breadth Requirement	(3)	

JUNIOR YEAR

FIRST TERM

16 credits

SECOND TERM

14 credits

Thermodynamics I	CIEG 231 (3)	
Fluid Mechanics	CIEG 305 (3)	
Water & WW Engineering ^a	CIEG 438 (3)	
Structural Analysis	CIEG 301 (4)	
Breadth Requirement	(3)	

Env. Engineering Lab ^b	CIEG 337 (3)	
Fluid Mechanics Lab	CIEG 306 (1)	
Prob. & Stats. for Engineers	CIEG 315 (3)	
Structural Design	CIEG 302 (4)	
Breadth Requirement	(3)	

Deleted: 15

Deleted: Technical Elective

Deleted: (4)

SENIOR YEAR

FIRST TERM

15 credits

SECOND TERM

17 credits

Senior Design	CIEG 461 (2)	
Solid Waste Mgt. ^b	CIEG 436 (3)	
Water Resources Eng	CIEG 440 (3)	
Soil Mechanics	CIEG 320 (3)	
Soil Mechanics Lab	CIEG 323 (1)	
Breadth Requirement	(3)	

Senior Design	CIEG 461 (2)	
Water Quality Lab ^a	CIEG 437 (3)	
Air Pollution Control	CIEG 434 (3)	
Technical Elective	(3)	
Technical Elective	(3)	
Tech & Earth Science Elec	(3)	

Deleted: 16

Deleted: 2

^a Course alternates: taught in even year; ^b Course alternates: taught in odd year.

BREADTH REQUIREMENTS (24 HOURS)

See General Education Handout distributed by the Dean's Office

Humanities	Social Sciences	Additional Humanities or Social Science courses	Required writing skills courses
(3)	(3)	(3)	ENGL 110 (3)
(3)	(3)	(3)	ENGL 410 (3)

OTHER GENERAL EDUCATION REQUIREMENTS

- _____ General Education plan approved ()
- _____ 2 courses (6 credits) above introductory level
- _____ (course numbers)
- _____ Course (3 credits for multicultural requirements)
- _____ 2 courses (6 credits) in the same department or program
- _____ (course numbers)

TECHNICAL ELECTIVES:

Course	Course

IMPORTANT NOTES:

Technical Elective requirements for Environmental Engineering are given on the reverse side of this sheet. More complete General Education requirements should be obtained from the faculty advisor. Additional details and up-to-date information are available from the office of the Chairperson. Students may arrange (with Faculty Advisor's approval) the sequence of these and other courses when prerequisites (if any) have been met. Number of credits per term may also be adjusted to individual needs.

- SYMBOLS:** Pre-registered () Course in Progress () Completed and Passed ()
 Not Required (N) Transfer Credit (T)

Name _____ **ENVIRONMENTAL ENGINEERING PROGRAM** Advisor _____

Transfer Credits **Environmental Engineering Biotechnology** (125 Hours)

Eval. by _____ Effective for EG07 and subsequent classes

Date _____ The required courses of the program are normally taught in the Fall or Spring Semesters as indicated below. Each student is responsible for *tracking* future changes in this schedule.

FRESHMAN YEAR

FIRST TERM 16 credits

Analytical Geom. & Calc. A	MATH 241 (4)	*
General Chemistrv	CHEM 103 (4)	*
Intro to Engineering	EGGG 101 (2)	
Critical Reading & Writing	ENGL 110 (3)	*
Computer Science	CISC 106 (3)	

SECOND TERM 15 credits

Analytical Geom. & Calc. B	MATH 242 (4)	*
General Chemistrv	CHEM 104 (4)	*
General Physics I	PHYS 207 (4)	*
Breadth Requirement	(3)	

Deleted: Note that EGGG 101 is a course substitution for CIEG 135, which is no longer taught.

Deleted: Breadth Requirement
Deleted: (3)

*Grade of "C-" or better required in these courses as degree requirement or as prerequisite for other courses.

SOPHOMORE YEAR

FIRST TERM 16 credits

Analytical Geom. & Calc. C	MATH 243 (4)	*
Technical Writing	ENGL 410 (3)	
Statics	CIEG 211 (3)	
Env. Engineering Processes	CIEG 233 (3)	*
Breadth Requirement	(3)	

SECOND TERM 15 credits

Differential Equations	MATH 302 (3)	
General Ecology	BI SC 302 (3)	
Breadth Requirement	(3)	
CAD, GIS, Surveying	CIEG 126 (3)	
Breadth Requirement	(3)	

Deleted: 16

Deleted: Solid Mechanics

Deleted: CIEG 212

Deleted: (3)

Deleted: CE Materials Lab

Deleted: CIEG 213

Deleted: (1)

JUNIOR YEAR

FIRST TERM 16 credits

Thermodynamics I	CHEG 231 (3)	
Fluid Mechanics	CIEG 305 (3)	
Water & WW Engineering ^a	CIEG 438 (3)	
Organic Chemistry	CHEM 331 (3)	
Organic Chemistry Lab	CHEM 333 (1)	
Breadth Requirement	(3)	

SECOND TERM 16 credits

Env. Engineering Lab ^b	CIEG 337 (3)	
Fluid Mechanics Lab	CIEG 306 (1)	
Prob. & Stats. for Engineers	CIEG 315 (3)	
Env. Soil Microbiology ^c	PL SC 319 (3)	
Technical Elective	(3)	
Breadth Requirement	(3)	

SENIOR YEAR

FIRST TERM 15 credits

Senior Design	CIEG 461 (2)	
Solid Waste Mgt. ^b	CIEG 436 (3)	
Water Resources Eng	CIEG 440 (3)	
Intro to Microbiology	BI SC 300 (4)	
Technical Elective	(3)	

SECOND TERM 16 credits

Senior Design	CIEG 461 (2)	
Water Quality Lab ^a	CIEG 437 (3)	
Air Pollution Control	CIEG 434 (3)	
Intro to Biochemistry	CHEM 342 (3)	
Tech Elective (Engineering)	(3)	
Technical Elective	(2)	

Deleted: 15

Deleted: 1

^a Course alternates: taught in even year; ^b Course alternates: taught in odd year.

^c Earth Science

BREADTH REQUIREMENTS (24 HOURS)

See General Education Handout distributed by the Dean's Office

Humanities		Social Sciences		Additional Humanities or Social Science courses		Required writing skills courses	
(3)		(3)		(3)		ENGL 110 (3)	
(3)		(3)		(3)		ENGL 410 (3)	

OTHER GENERAL EDUCATION REQUIREMENTS

- _____ General Education plan approved ()
- _____ 2 courses (6 credits) above introductory level
- _____ (course numbers)
- _____ Course (3 credits for multicultural requirements)
- _____ 2 courses (6 credits) in the same department or program
- _____ (course numbers)

TECHNICAL ELECTIVES:

Course	Course

IMPORTANT NOTES:

Technical Elective requirements for Environmental Engineering are given on the reverse side of this sheet. More complete General Education requirements should be obtained from the faculty advisor. Additional details and up-to-date information are available from the office of the Chairperson. Students may arrange (with Faculty Advisor's approval) the sequence of these and other courses when prerequisites (if any) have been met. Number of credits per term may also be adjusted to individual needs.

SYMBOLS: Pre-registered () Course in Progress () Completed and Passed ()
Not Required (N) Transfer Credit (T)

Name _____ **ENVIRONMENTAL ENGINEERING PROGRAM** Advisor _____

Transfer Credits **Water Resources and Water Quality** (125 Hours)

Eval. by _____ Effective for EG07 and subsequent classes

Date _____ The required courses of the program are normally taught in Fall or Spring Semesters as indicated below. Each student is responsible for tracking future changes in this schedule.

FRESHMAN YEAR

FIRST TERM 16 credits

Analytical Geom. & Calc. A	MATH 241 (4)	*
General Chemistrv	CHEM 103 (4)	*
Intro to Engineering	EGGG 101 (2)	
Critical Reading & Writing	ENGL 110 (3)	
Computer Science	CISC 106 (3)	

SECOND TERM 15 credits

Analytical Geom. & Calc. B	MATH 242 (4)	*
General Chemistrv	CHEM 104 (4)	*
General Physics I	PHYS 207 (4)	*
Breadth Requirement	(3)	

Deleted: Breadth Requirement
Deleted: (3)

*Grade of "C-" or better required in these courses as degree requirement or as prerequisite for other courses.

SOPHOMORE YEAR

FIRST TERM 16 credits

Analytical Geom. & Calc. C	MATH 243 (4)	*
Technical Writing	ENGL 410 (3)	
Statics	CIEG 211 (3)	
Env. Engineering Processes	CIEG 233 (3)	*
Breadth Requirement	(3)	

SECOND TERM 15 credits

Differential Equations	MATH 302 (3)	
General Ecology	BIJC 302 (3)	
Breadth Requirement	(3)	
CAD, GIS, Surveying	CIEG 126 (3)	
Breadth Requirement	(3)	

Deleted: 16
Deleted: Solid Mechanics
Deleted: CIEG 212
Deleted: (3)
Deleted: CE Materials Lab
Deleted: CIEG 213
Deleted: (1)

JUNIOR YEAR

FIRST TERM 15 credits

Thermodynamics I	CIEG 231 (3)	
Fluid Mechanics	CIEG 305 (3)	
Water & WW Engineering ^a	CIEG 438 (3)	
Water Resources Eng.	CIEG 440 (3)	
Breadth Requirement	(3)	

SECOND TERM 16 credits

Env. Engineering Lab ^b	CIEG 337 (3)	
Fluid Mechanics Lab	CIEG 306 (1)	
Prob. & Stats. for Engineers	CIEG 315 (3)	
Technical Elective	(3)	
Technical Elective	(3)	
Breadth Requirement	(3)	

SENIOR YEAR

FIRST TERM 15 credits

Senior Design	CIEG 461 (2)	
Solid Waste Mgt. ^b	CIEG 436 (3)	
Storm Water Management	EGTE 321 (4)	
Princ of Wtr Qual Criteria ^a	CIEG 468 (3)	
Technical Elective	(3)	

SECOND TERM 16 credits

Senior Design	CIEG 461 (2)	
Water Quality Lab ^a	CIEG 437 (3)	
Air Pollution Control	CIEG 434 (3)	
Grdwtr Flow & Cont Trans ^c	CIEG 498 (3)	
Wtr Quality Modeling	CIEG 430 (3)	
Technical Elective	(3)	

Deleted: 2

^a Course alternates: taught in even year; ^b Course alternates: taught in odd year; ^c Earth Science

BREADTH REQUIREMENTS (24 HOURS)

See General Education Handout distributed by the Dean's Office

Humanities	Social Sciences	Additional Humanities or Social Science courses	Required writing skills courses
(3)	(3)	(3)	ENGL 110 (3)
(3)	(3)	(3)	ENGL 410 (3)

OTHER GENERAL EDUCATION REQUIREMENTS

_____ General Education plan approved () _____ Course (3 credits for multicultural requirements)
 _____ 2 courses (6 credits) above introductory level _____ 2 courses (6 credits) in the same department or program
 _____ (course numbers) _____ (course numbers)

TECHNICAL ELECTIVES:

Course	Course

IMPORTANT NOTES:

Technical Elective requirements for Environmental Engineering are given on the reverse side of this sheet. More complete General Education requirements should be obtained from the faculty advisor. Additional details and up-to-date information are available from the office of the Chairperson. Students may arrange (with Faculty Advisor's approval) the sequence of these and other courses when prerequisites (if any) have been met. Number of credits per term may also be adjusted to individual needs.

SYMBOLS: Pre-registered () Course in Progress () Completed and Passed ()
 Not Required (N) Transfer Credit (T)