

## Program Change Request

Date Submitted: 09/26/17 4:13 pm

Viewing: **ENEGMS : Environmental Engineering, Master of Science in**

### Environmental Engineering

Last approved: 05/17/16 1:34 pm

Last edit: 11/08/17 1:33 pm

Changes proposed by: rdw

Catalog Pages Using Environmental Engineering (ENEG) this Program

Submitter:	User ID: calison	Phone: 575-7535 <del>575-6731</del>
Program Status	Active	
Academic Level	Graduate	
Type of proposal	Major/Field of Study	
Select a reason for this modification		
Making Minor Changes to an Existing Degree (e.g. changing 15 or fewer hours, changing admission/graduation requirements, adding Focused Study)		
Are you adding a concentration?	No	
Are you adding a track?	No	
Are you adding a focused study?	No	
Effective Catalog Year	Fall 2018	
College/School Code	College of Engineering(ENGR)	
Department Code	Department of Civil Engineering(CVEG)	
Program Code	ENEGMS	
Degree	Master of Science in Environmental Engineering	
CIP Code	14.1401 - Environmental/Environmental Health Engineering.	
Program Title	Environmental Engineering, Master of Science in Environmental Engineering	
Program Delivery Method	On Campus	
Is this program interdisciplinary?		
No		
Does this proposal impact any courses from another College/School?		
No		
What are the total hours needed to complete the program?	30	

#### In Workflow

1. ENGR Dean Initial
2. GRAD Dean Initial
3. Director of Program Assessment and Review
4. Registrar Initial
5. CVEG Chair
6. ENGR Curriculum Committee
7. ENGR Faculty
8. ENGR Dean
9. Global Campus
10. Provost Review
11. University Course and Program Committee
12. Graduate Committee
13. Faculty Senate
14. Provost Final
15. Provost's Office-- Notification of Approval
16. Registrar Final
17. Catalog Editor Final

#### Approval Path

1. 09/14/17 9:19 am Norman Dennis (ndennis): Rollback to Initiator
2. 10/13/17 2:29 pm Norman Dennis (ndennis): Approved for ENGR Dean Initial
3. 10/13/17 2:38 pm Patricia Koski (pkoski): Approved for GRAD Dean Initial
4. 10/13/17 5:02 pm Alice Griffin (agriffin): Approved for Director of Program Assessment and Review
5. 10/16/17 5:41 pm Lisa Kulczak (lkulcza): Approved for Registrar Initial
6. 10/18/17 10:57 am Micah Hale (micah): Approved for CVEG Chair

### Program Requirements and Description

#### Requirements

**Admission Criteria:** **Admission Criteria:** In addition to the requirements of the Graduate School, the following are the minimum criteria for admission to the M.S.En.E. degree program:

GPA: 3.00 or higher  
 GRE Scores: No less than 302 (verbal + quantitative) and 3.5 analytical writing  
**Degree Requirements:**

7. 11/07/17 5:48 pm  
Manuel Rossetti (rossetti): Approved for ENGR Curriculum Committee
8. 11/08/17 9:03 am  
Norman Dennis (ndennis): Approved for ENGR Faculty
9. 11/08/17 1:34 pm  
Norman Dennis (ndennis): Approved for ENGR Dean
10. 11/09/17 10:11 am  
Kiersten Bible (kbible): Approved for Global Campus
11. 11/10/17 10:37 am  
Terry Martin (tmartin): Approved for Provost Review
12. 11/20/17 2:51 pm  
Alice Griffin (agriffin): Approved for University Course and Program Committee
13. 12/20/17 9:04 am  
Patricia Koski (pkoski): Approved for Graduate Committee

**History**

1. Jun 10, 2015 by Charlie Alison (calison)
2. Aug 14, 2015 by Lisa Kulczak (lkulcza)
3. May 17, 2016 by Lisa Kulczak (lkulcza)

**Required Courses**

CVEG-5203	Water Chemistry (Sp)	3
CVEG-5213	Water Treatment & Distribution System Design (Sp)	3
CVEG-5214	Advanced Wastewater Process Design and Analysis (Fa)	4
CVEG-5233	Microbiology for Environmental Engineers (Irregular)	3
CVEG-5273	Open Channel Flow (Irregular)	3

**Thesis Option:** Accreditation of the M.S.En.E program by the Accreditation Board for Engineering and Technology (ABET) requires candidates to fulfill some baccalaureate degree requirements in non-engineering and engineering undergraduate courses. Candidates must complete the State of Arkansas Minimum Core Curriculum for baccalaureate degrees, which includes American History, Government, English Composition, Higher Mathematics, Science, Humanities & Fine Arts, and Social Sciences. Regardless of undergraduate discipline, each candidate must complete a number of basic undergraduate engineering courses. In general, graduates of ABET-accredited engineering programs will have already completed most, if not all, of these courses. However, the prerequisite requirements for graduates of programs other than engineering can be quite significant. All M.S.En.E degree candidates, regardless of previous degree status, must demonstrate completion of the Basic Engineering Education and Environmental Engineering breadth requirements listed below. The cumulative grade point average on basic engineering education and environmental engineering breadth courses must be at least 2.70. Candidates who do not possess a degree from a program accredited by ABET must also satisfy the basic level ABET accreditation requirement. These include completion of no less than 32 credit hours of university-level mathematics and science, and 48 credit hours of approved engineering topics. Candidates must also demonstrate to the satisfaction of the student's graduate study committee, that he/she possess the abilities and characteristics required of graduates from ABET-accredited engineering programs. This shall include the completion of a course that concentrates on a major design project which results in the production of a design report or other design product as appropriate. The design project must build on and require engineering

knowledge and skills from previous course work and must incorporate engineering standards and realistic constraints. The course selected to satisfy this requirement is subject to the approval of the student's graduate study committee. Exceptions to these degree requirements may be requested by means of a petition outlining the reasons for the exceptions and presenting an alternate plan for completing the program. The petition shall be subject to the approval of the student's graduate study committee, program faculty, and the Director of the M.S.En.E. program. Credit for courses taken at another institution is subject to the approval of the Director of the M.S.En.E. program. In particular, advanced engineering courses (3000, 4000, and 5000-level at the University of Arkansas) normally will not be accepted for transfer from institutions or degree programs that are not accredited by ABET. Students should also be aware of Graduate School requirements with regard to master's degrees. I. Basic Engineering Education Requirements—II. Environmental Engineering Breadth Requirements (18 hours)—III. Environmental Engineering (M.S.En.E) Graduate Degree Requirements The M.S.En.E. **A minimum of 30 semester hours of program requirements for graduate-level credits, 24 semester hours of graded course work include the minimum requirements of the Graduate School and a minimum of six semester hours of thesis**

**Required Topics and Recommended Courses**

BENG 3723	Unit Operations in Biological Engineering (Sp)
BENG 4933	Sustainable Watershed Engineering (Fa)
CHEG 3333	Chemical Engineering Reactor Design (Sp, Fa)
CHEG 4813	Chemical Process Safety (Fa)
CVEG 3133	Soil Mechanics (Sp, Fa)
CVEG 4203	Environmental Regulations and Permits (Fa)
CVEG 4243	Environmental Engineering Design (Sp, Fa)
CVEG 3223	Hydrology (Sp, Fa)
CVEG 4513	Construction Management (Sp, Fa)
CVEG 4273	Open Channel Flow (Sp)
INEG 4223	Occupational Safety and Health Standards (Irregular)

Total Hours 18

**General Education Recommended Courses**

**24**

Humanities/Social Science (15 hours)

Acceptable to Undergraduate Program

American History or American Government (3 hours)

HIST 2003 History of the American People to 1877 (ACTS Equivalency = HIST 2113) (Sp, Su, Fa)

HIST 2013 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123) (Sp, Su, Fa)

PLSC 2003 American National Government (ACTS Equivalency = PLSC 2003) (Sp, Su, Fa)

English Composition (6 hours)

ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (Sp, Su, Fa)

& ENGL 1023 and Composition II (ACTS Equivalency = ENGL 1023) (Sp, Su, Fa)

**Mathematics and Basic Science Recommended Courses**

**35**

Calculus Through Differential Equations (15 hours)

MATH 2554 Calculus I (ACTS Equivalency = MATH 2405) (Sp, Su, Fa)

MATH 2564 Calculus II (ACTS Equivalency = MATH 2505) (Sp, Su, Fa)

MATH 2574 Calculus III (ACTS Equivalency = MATH 2603) (Sp, Su, Fa)

or MATH 2584 Elementary Differential Equations (Sp, Su, Fa)

& MATH 3083 and Linear Algebra (Sp, Su, Fa)

Statistics and Probability (3 hours)

INEG 2313 Applied Probability and Statistics for Engineers I (Sp, Fa)

STAT 3013 Introduction to Probability (Sp, Su, Fa)

General Chemistry (3 hours)

CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) (Su, Fa)

CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) (Sp, Su, Fa)

& CHEM 1121L and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab) (Sp, Su, Fa)

University Physics (calculus-based) (4 hours)

PHYS 2054 University Physics I (ACTS Equivalency = PHYS 2034) (Sp, Su, Fa)

Microbiology (4 hours)

BIOL 2013 General Microbiology (ACTS Equivalency = BIOL 2004 Lecture) (Sp, Su, Fa)

& BIOL 2011L and General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab) (Sp, Su, Fa)

Organic Chemistry (4 hours)

CHEM 3504 Physical Chemistry I (Fa)

CHEM 3603 Organic Chemistry I (Su, Fa)

& CHEM 3601L and Organic Chemistry I Laboratory (Su, Fa)

Earth Science (2 hours)

GEOS 1113 General Geology (ACTS Equivalency = GEOL 1114 Lecture) (Sp, Su, Fa)

CSES 2203 Soil Science (Sp, Fa)

**General Engineering Education**

**20-21**

**Required Topics and Recommended Courses**

Statics & Mechanics of Materials (5-6 hours)

MEEG 2003 Statics (Sp, Su, Fa)

& MEEG 3013 and Mechanics of Materials (Sp, Su, Fa) (&)

CVEG-2015	Fundamentals of Mechanics for Civil Engineers (Sp, Fa)
	Hydraulics or Fluid Mechanics (3 hours)
CVEG-3213	Hydraulics (Sp, Fa)
CHEG-2133	Fluid Mechanics (Sp, Su, Fa)
MEEG-3503	Mechanics of Fluids (Su, Fa)
	Engineering Economics (3 hours)
INEG-2413	Engineering Economic Analysis (Sp, Fa)
	Thermodynamics (3 hours)
CHEG-3144	Heat and Mass Transfer (Sp, Fa)
MEEG-2403	Thermodynamics (Sp, Su, Fa)
	Environmental Engineering (3 hours)
CVEG-3243	Environmental Engineering (Sp, Fa)
	Environmental Engineering Design (3 hours)
CVEG-4243	Environmental Engineering Design (Sp, Fa)

Total Hours

0

~~requirements that are specific to the M.S.En.E.~~

**Course Work Only Option: 30 semester hours of graded graduate-level course credits.**

**Both Options:**

~~Upon admission exceptions to the Graduate School and acceptance in a program these degree requirements may be requested by means of study, candidates pursuing a thesis-based program will be assigned an adviser, who will assist a petition outlining the reasons for the candidate with course selection and with finding a major advisor. The major advisor and exceptions and presenting an alternate plan for completing the candidate will select a graduate committee. program. The candidate and major advisor, with guidance from petition shall be subject to the graduate committee, will develop a plan approval of the student's graduate study and a research project for completion committee, program faculty, and the Director of the requirements for the degree. M.S.En.E. The graduate committee will serve as course selected to satisfy this requirement is subject to the examination committee for approval of the research, the thesis, and the final oral and/or written examination. student's graduate study committee. Candidates pursuing Candidates who do not possess a coursework-based degree from a program will be assigned to a major adviser, who will assist the candidate in selection accredited by ABET must also satisfy the basic level ABET accreditation requirement. These include completion of a graduate committee, developing a plan no less than 32 credit hours of study; university-level mathematics and coordination science, and 48 credit hours of approved engineering topics. Candidates must also demonstrate to the final oral and/or written examination. satisfaction of the student's graduate study committee, that he/she possess the abilities and characteristics required of graduates from ABET accredited engineering programs. This shall include the completion of a course that concentrates on a major design project which results in the production of a design report or other design product as appropriate. program:~~ No more than six ~~nine~~ graduate credit hours presented for the M.S.En.E. degree may be 4000-level.

**Required courses listed below.**

CVEG 5203	Water Chemistry
CVEG 5213	Water Treatment & Distribution System Design
CVEG 5214	Advanced Wastewater Process Design and Analysis
CVEG 5233	Microbiology for Environmental Engineers
CVEG 5273	Open Channel Flow

- ~~The minimum acceptable grade for each course presented for the degree is a "C" (2.0 grade points). Candidates for the degree must present a The cumulative grade point grade-point average of 3.00 on all graduate courses. courses presented for the degree must be at least 3.00. The minimum acceptable grade for any each course presented for the degree is "C". a "C" (2.0 grade points).~~
- ~~A comprehensive examination that will include either a defense of the candidate's thesis or a presentation and discussion of the candidate's course work. master's report.~~
- ~~Students should also be aware of Graduate School requirements with regard to master's degrees.~~
- ~~Students should be aware that most or all of the courses in this program have pre-requisite requirements. Students will be required to meet these pre-requisite requirements or obtain instructor permission to enroll.~~

~~Required courses listed below. Thesis Option: 30 hours of graduate-level course work, approved by the student's graduate adviser, including satisfactorily completing a total of 24 hours of graded graduate course work and six hours of research resulting in a written master's thesis. Non-Thesis Option: 33 hours of graduate-level course work, which must be approved by the student's graduate adviser, including satisfactorily completing a total of 30 hours of graded graduate course work and three hours of independent study resulting in a written master's report.~~

**Required Courses**

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CVEG-5273	Open Channel Flow (Irregular)	3

	No	Are Similar Programs available in the area?
Estimated Student Demand for Program	NA	
Scheduled Program Review Date	NA	

Program Goals and Objectives

**Program Goals and Objectives**

The goal of the M.S.En.E. program is to prepare graduates for careers in environmental engineering practice with government agencies, engineering firms, or industries and to provide a foundation for continued study at the post-masters level.

The objectives of the M.S.En.E. program are to provide a greater depth of understanding of environmental engineering topics for the practice of engineering and to serve as preparation for doctoral studies. Students are allowed a great deal of flexibility in designing their course of study. Students desiring to develop a deeper understanding of one sub-discipline area may select courses solely concentrated in that area while those desiring a broader-based education may select courses from several sub-disciplines including courses from other disciplines. **NA**

Learning Outcomes

**Learning Outcomes**

1. Apply knowledge of math, science, and engineering to solve advanced-level problems in environment engineering
2. Locate and evaluate pertinent published literature relevant to a given topic, and apply the information gained to a design, analysis, or research effort
3. Effectively communicate scientific and technical information in English, both in writing and oral forms
4. Design and conduct experiments, and analyze and evaluate the resulting data
5. Design a system, component, or process to meet a scientific or technological needs

**NA**

Description and justification of the request

Description of specific change	Justification for this change
The Department decided to drop the ABET accreditation for this program which removed the requirement for the completion of deficiency courses. Thus we must update the catalog description to assure student awareness of the changes	The previous version of this program was open to students from non-engineering programs. This version of the program is intended for students possessing a Bachelor of Science in Engineering Degree.

Upload attachments

- Reviewer Comments
- Norman Dennis (ndennis) (09/14/17 9:19 am):** Rollback: In the justification box you have described why you are doing this, however, you have not described what you are doing. Committees do not get to see this entire screen. they make decisions based on what shows up in the description of change in the justification box. Please summarize your changes in that box. What are the defacto pre-requisites needed to that the required 5000 level courses?
  - Norman Dennis (ndennis) (10/13/17 2:28 pm):** Modified introductory material
  - Alice Griffin (agriffin) (10/13/17 4:30 pm):** Changed effective catalog date from fall 2017 to fall 2018.
  - Alice Griffin (agriffin) (10/13/17 5:02 pm):** Minor edits to program requirements. Removed duplicate language.
  - Lisa Kulczak (lkulcza) (10/16/17 5:40 pm):** Edited information from the Program Requirements field that should be managed/edited in CAT. Emailed Rod Williams and Pat Koski with that information.
  - Norman Dennis (ndennis) (11/08/17 1:33 pm):** Added student learning outcomes

Key: 259