DEPARTMENT OF
CIVIL & ENVIRONMENTAL
ENGINEERING

ENVIRONMENTAL & WATER RESOURCES ENGINEERING GRADUATE PROGRAM

INFORMATION, PROCEDURES, AND ADVISING MANUAL

September 2008

COLLEGE OF ENGINEERING
UNIVERSITY OF MASSACHUSETTS at AMHERST

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PREFACE

This manual is designed to assist graduate students and faculty in the UMass Environmental and Water Resources Engineering (EWRE) Program. It contains the following information:

*** General information about key personnel and faculty in the Department of Civil and Environmental Engineering (CEE) and the EWRE Program;
*** Summaries of degree requirements, advising procedures, and Program requirements including forms which must be completed for the M.S. degree in Environmental Engineering.
*** Other EWRE Program information.

The EWRE Program is a graduate program within the Department of Civil and Environmental Engineering. The Department offers and administers three graduate degrees: M.S. and Ph.D. in Civil Engineering and the M.S. in Environmental Engineering. Any of these three degrees may be pursued by eligible students studying environmental and water resources engineering. Specific information regarding requirements for the degrees are described in later sections. Special attention is devoted to the Master of Science in Environmental Engineering degree which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET).

EWRE PROGRAM OBJECTIVES & OUTCOMES

The faculty have organized the EWRE Program, including its curriculum, course requirements, course content, and research activities to educate and prepare our students for careers in environmental and water resources engineering research and professional practice. The specific objectives of the MS in Environmental Engineering Degree and overall graduate Program are:

1) Program graduates will enter the environmental engineering profession or continue with PhD level graduate studies.
2) Program graduates will be recognized by supervisors and colleagues as possessing the skills needed to successfully work in the environmental engineering profession.
3) Program graduates will provide service to society through involvement in professional societies, community groups, charitable organizations or similar activities.
4) Throughout their careers, program graduates will use educational opportunities to continue to expand their understanding and skills in science and engineering for the protection of human health and the environment.

To further define our expectations for the Program we have agreed on capabilities that each student should possess at the completion of the ABET accredited MS in Environmental Engineering degree program. These outcomes are as follows:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
(l) proficiency in mathematics through differential equations, probability and statistics, calculus-based physics, general chemistry, an earth science (such as geology, meteorology, soil science, groundwater), a biological science (such as microbiology, aquatic biology, toxicology, environmental biotechnology), and fluid mechanics;
(m) introductory level knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts;
(n) an ability to conduct laboratory experiments and to critically analyze and interpret data in more than one major environmental engineering focus areas, e.g., air, water, land, environmental health;
(o) an ability to perform engineering design by means of design experiences integrated throughout the masters degree curriculum;
(p) proficiency in advanced principles and practice relevant to physical, chemical and biological processes in natural and engineered environmental systems;
(q) an understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

PEOPLE YOU SHOULD KNOW

CIVIL AND ENVIRONMENTAL ENGINEERING PERSONNEL

The Department of Civil and Environmental Engineering main offices are located on the second floor of Marston Hall. Graduate students may interact with the CEE Department Head, CEE Graduate Program Director and Department staff. These individuals are:

* Richard Palmer, Professor and Head, Department of Civil and Environmental Engineering, Marston 224, (545-2508).
* Carlton Ho, Professor and CE Graduate Program Director, who administers M.S. and Ph.D. (Civil Engineering) degrees for the Department of Civil and Environmental Engineering
* Caroline Nofio, Administrative Officer, Marston 224, (545-2567).
* Jodi G. Ozdarski, Academic Assistant, Grad & Undergrad students, Marston 226, (545-0686).
* Jessica Appleby, Secretary, Marston 224, (545-2508)
* Cheryl Petit, Bookkeeper, Marston 226 (545-2566)
* Mary S. Bisbee, Secretary, Marston 18 (545-2172)
* Sherrie Webb-Yagodzinski, ELab II Laboratory Manager,(577-3231)
* Dave Glazier, Technician, Gunness (545-2754)

ENVIRONMENTAL & WATER RESOURCES ENGINEERING FACULTY AND STAFF

The faculty in the EWRE Program (as of September 2008) are:

* David P. Ahlfeld, Professor, Marston 12A (545-2681)
* Casey Brown, Assistant Professor, Marston 12B, (577-2337)
* Sarina J. Ergas, Associate Professor, Marston 18B (545-3424)
* David W. Ostendorf, Professor, Marston 18C (545-5395)
* Richard A. Palmer, Professor, Marston 224 (545-2508)
* Chul Park, Assistant Professor, Marston 16A (545-9456)
* Mi-Hyun Park, Assistant Professor, Marston 16 D (545-5390)
* David A. Reckhow, Professor, Marston 16C (545-5392)
* Erik J. Rosenfeldt, Assistant Professor, Marston 16B (545-5396)
* John E. Tobiason, Professor, MSEVE Graduate Program Director, Marston 21 (545-5397)

The Program staff include:

* Kathleen Whynott, Grants Manager, Marston 18 (545-0687)

GETTING SET UP

Paychecks. Paychecks can be obtained from Mary Bisbee in the EWRE Program office (Marston 18) every second Friday. Students who want their checks deposited directly into a local bank should obtain appropriate forms from the Human Resources Office in Whitmore Hall. Statements for automatic deposits will also be sent to the Program office.

Photocopying. For graduate students on research projects, photocopying services are available through the Program office (Marston Hall, Rm. 18) and in ELab II Rm 210. In order to use this service for a research project, you need your advisor's permission and a copying code. Personal copying is strictly limited and is charged at the rate of ten cents per page.

Offices. Students who are funded as teaching or research assistants are assigned an office and a research area (if appropriate) located in either Marston Hall or Engineering Laboratory II (ELAB II). Specific room assignments are made by the Program Director.

Keys. Office keys can be obtained by first getting a form from Mary Bisbee (Marston 18). It is important to keep office and lab areas locked during "off hours" (approx. 6 pm to 8 am, Mon-Fri, and on weekends). When leaving office or lab areas, each person should make sure doors are locked. Many doors in ELab II require a key to be unlocked, and require a key to re-lock the door. Please keep doors locked during "off-hours" and assume that doors will be locked (i.e., carry your keys with you). Access to ELab II between 7 pm and 7 am, Monday-Friday, and on weekends is gained by swiping your UMass ID card through readers near the building entrance doors. You must supply Mary Bisbee with your UMass ID number so you can be entered on the list of persons alloweds to access the building.

Telephone. Several student office areas have phones. The student phones are for local and long distance calls. A telephone access number is needed from your advisor to use the telephone system for making long distance calls. Long distance calls are to be made only for University business. Under no circumstances are COLLECT calls to be accepted on these lines.

Mailboxes. EWRE graduate students have a mailbox in Rm 12 Marston Hall (Perrell Lab). Memos and notices from staff members, as well as faxes, messages from professors, etc., will be put in the mailboxes. It is important that you check your mailboxes regularly to learn of important announcements. Please also note that most memos and notices will be distributed via email, so check that regularly also.

Computer Services. Engineering Computing Services (ECS) supports the research and instructional computing needs of the College of Engineering. ECS installs and maintains all network hardware within the College. ECS operates a cluster of Unix-based computers that operate the mail system and other network functions. These Unix-based computers can be accessed through an ECS account from any computer in the College that is connected to the network. It is also possible to phone in from remote locations. Most EVE students will use one of the many personal computers available. However, it is essential that all graduate students have an ECS account to have access to email. The Program uses email extensively to communicate among staff, faculty and students. Account applications and related information are available in the ECS Bookstore in Marcus Room 100. The Program has one computer room for use by EWRE graduate students: Marston 12 (Perrell Lab). Please refer to Appendix B for a complete description of the facilities and procedures to follow in using these facilities.

Laboratories. The Program has several research and teaching laboratories in Marston Hall and ELAB II. The use of these facilities is described in the *Environmental Engineering Research Laboratory Rules and Protocols Manual* which contains information about the program's laboratories.

Responsibilities of Assistantships. Students who receive 20 hours per week of TA or RA support are full-time students (half time in courses and thesis and half time on TA or RA activities). As such, employment outside the Program is not permitted. It is also expected that students will remain on-campus while receiving support. The timing and length of vacations or other trips off campus should be approved by your advisor.

DEGREE REQUIREMENTS AND ADVISING

GENERAL

Graduate students in the Environmental and Water Resources Engineering Program may pursue one of three graduate degrees. The Department of Civil and Environmental Engineering offers M.S. and PhD degrees in Civil Engineering (with emphasis in environmental engineering) and the EWRE Program offers the M.S. in Environmental Engineering degree. The latter degree is accredited by the Engineering Accreditation Commission of ABET, Inc..

The material presented below is provided for the information and guidance of graduate students and their faculty advisors. Regulations governing the degrees come from three levels: the Graduate School, the Department of Civil and Environmental Engineering, and the EWRE Program. Your faculty advisor (see Advising) will assist you in the planning of your graduate degree program so that you meet all requirements; however, the ultimate responsibility lies with the student.

There are certain documents/information sources you should have access to so you can meet all requirements. From the Graduate School you should refer to the current copies of the ***Graduate School Bulletin*** and the ***Graduate School Handbook*** . These documents provide information about Graduate School regulations, registration, due dates, thesis and dissertation requirements, etc.

In addition the Department of Civil and Environmental Engineering has information available on ***Regulations Governing The M.S. and Ph.D. Programs of the Department of Civil and Environmental Engineering***. The information is available on the CEE Deaprtment web site at http://www.ecs.umass.edu/index.pl?id=3896&isa=Category&op=show

Academic Honesty. The UMass Academic Honesty Policy applies and can be found in the Code of Student Conduct online at:
http://www.umass.edu/dean_students/downloads/CodeStudentConduct_0506.pdf
This policy covers plagiarism, cheating, fabrication and facilitating dishonesty. In our "online" world of electronic information, it is especially important to properly cite and quote sources to refrain from plagiarism.

M.S. DEGREES

Two M.S. degrees are offered: the M.S. in Civil Engineering and the M.S. in Environmental Engineering (accredited by ABET). EWRE Program requirements are presented here. As mentioned earlier, be sure to refer to the documents indicated above for Graduate School and CEE Department requirements.

Students may pursue either M.S. degree depending on their undergraduate academic background and goals. Students with an ABET accredited bachelor's degree in an engineering field (often Civil or Chemical) may earn the M.S. in Environmental Engineering. Students who have been admitted into the Program without an engineering baccalaureate, must make up coursework at the basic level of undergraduate engineering in order to be eligible for the M.S. in Environmental Engineering - no graduate credit is granted for this basic level work. Students with a non-ABET accredited bachelor's degree, usually in Civil, Environmental or Chemical Engineering from a non-US institution, may earn the M.S. in Civil Engineering degree and do not have to meet ABET requirements, but must meet all other Program, Department, and Graduate School requirements. Please see your faculty advisor if you have any questions.

Students with Engineering Baccalaureate - Research Option

The course requirements for students with a bachelor's degree in engineering from an ABET accredited program are described below. All degree candidates must earn a minimum of 31 graduate credits.

*** Core Courses**

The core courses are intended to provide students with a basic knowledge of environmental engineering processes and design. These required courses are:

Designation	Title	Credits
CEE 671	Environmental Biological Processes	4 (2 design)
CEE 672	Phys. & Chem. Treatment Processes	4 (2 design)
CEE 770	Environmental Engineering Design	4 (4 design)
CEE 691/692	Seminar	1

*** Master's Project**

The student is required to write a research report and present an oral defense before a Master's Committee on a topic determined in consultation with the advisor. The content of the report normally derives from the research conducted by the student as part of their research assistant duties. Six (6) credits, taken as CEE 689, must be earned under the Master's Project and are part of the 31 total credit requirement; more than 6 credits of CEE 689 may be earned, but only 6 credits apply to the 31 credit total required for the M.S .degree.

*** Electives**

In addition to the Core Courses and Master's Project the student completes a minimum of twelve credits of electives taken in areas relevant to the student's professional objectives. All elective courses must be taken at the graduate level (500 level or higher). The electives must include at least one of the following courses: CEE 525, CEE 560, CEE 577, CEE 579, CEE 660, CEE 661, CEE 680, CEE 776. Students may take electives in other departments at the University; however, no more than 9 graduate credits taken outside the Civil and Environmental Engineering Department can be counted toward the 31 credit requirement.

*** Transfer Credits**

No more than six graduate credits can be transferred from courses taken before the student enters the Environmental & Water Resources Engineering Program. These credits must be at the graduate level and must not have been utilized to have met undergraduate degree requirements.

*** Engineering Design Credits**

As a minimum, ten graduate credits in engineering design must be earned. The core courses provide students with 8 design credits. The student must take at least an additional 2 credits of design from elective courses. Some courses are partially design and therefore contribute one or two credits to the design category. Table 1 shows the breakdown of design and engineering science content for the Program's graduate courses.

Table 1: Engineering Science and Design Credits in EVE Graduate Level Courses

Graduate Courses		Total Credits	ES[1]	ED[2]
CEE 525	Environmental Geotechnology	3	1	2
CEE 560	Hydrology	3	2	1
CEE 561	Open Channel Flow	3	2	1
CEE 572	Environmental Engineering Analysis	3	3	0
CEE 573	Environmental Engineering Microbiology	3	3	0
CEE 575	Advanced Solid and Haz. Waste Management	3	2	1
CEE 577	Surface Water Qual. Control	3	2	1
CEE 579	Air Quality	3	1	2
CEE 590N	Numerical Methods for Env. Engr. & Wat. Res.	3	2	1
CEE 597G	GIS for Engineers	3	2	1
CEE 660	Subsurface Hydraulics	3	2	1
CEE 661	Subsurface Pollution	3	2	1
CEE 662	Water Resources Systems Anal.	3	1	2
CEE 671	Environmental Biological Processes	4	2	2
CEE 672	Physical Chemical Treatment Processes	4	2	2
CEE 680	Aquatic Chemistry	4	4	0
CEE 690K	Environmental Reaction Kinetics	3	3	0
CEE 770	Environ. Engr. Design	4	0	4
CEE 772	Inst. Methods in Envir. Anal.	3	3	0
CEE 774	Processes at the Particle-Water Interface	3	3	0
CEE 776	Bioremediation of Contam. Soils and Grd. Wat.	3	1.5	1.5
CEE 778	Drink. Wat. Indicator Org. and Pathogen Micro.	3	3	

[1] ES = Engineering Science
[2] ED = Engineering Design

Students with Engineering Baccalaureate - Professional Practice Option

This option is similar to the Research Option, but there are some significant differences. Admission to this program is open only to BS Engineering students. It has a 31 credit requirement. An Engineering Report (3 credits) is required rather than a Master's Project (6 credits). Students are able to complete this degree in a 12 month period rather than the 18 to 24 month period which is typical for the research option for a student with a BS in Engineering. This shorter time frame is possible since students are not employed as teaching or research assistants. Financial aid is not offered for this option.

In addition to the core courses listed for the Research Option, students in the Professional Practice option are required to take CEE 680 (Aquatic Chemistry) in the Fall semester. The Engineering Report is generally prepared in the summer following the spring semester. A written report is required as well as an oral defense before a MS committee (of 2 members).

Fall		Spring		Summer	
CEE 671	4 cr	CEE 672	4 cr	CEE 679 Engr Project	3 cr
CEE 680	4 cr	CEE 770	4 cr		
Electives	6 cr	CEE 692	1 cr		
	14 cr	Electives	6 cr		
			15 cr		

*** Electives, Transfer and Design Credits**

There are 12 credits of electives. All electives must be taken at the graduate level. The student is required to draw one elective from Group A and one elective from Group B. No more than six graduate credits can be transferred from courses taken before the student enters the Environmental Engineering Program. At least ten credits in engineering design must be earned. The required courses provide eight of these credits; at least 2 more design credits must be earned from electives.

Group A (Modelling and Transport): CEE 577, CEE 660, CEE 661, CEE 690K, CEE 774

Group B (Water Resources, Solid and Hazardous Wastes): CEE 525, CEE 560, CEE 561, CEE 575, CEE 579, CEE 662, CEE 776

Students with Non-engineering Baccalaureate

To be awarded the degree of Master of Science in Environmental Engineering the student must make up coursework required for basic level engineering.

*** Mathematics and Basic Sciences** At least 32 credits.

Studies in Mathematics must be beyond trigonometry and must emphasize mathematical concepts and principles rather than computations. Student are required to take, or show that they have taken courses equivalent to, these UMass courses: Math 131 Calculus I, Math 132 Calculus II , Math 233 Multivariable Calculus, Math 331 Ordinary Differential Equations. In addition students must take a probability and statistics course.

The Basic Sciences must include both general chemistry and physics (calculus-based) with at least a 2 semester (or equivalent) sequence of study in either area. Additional coursework in life sciences, earth sciences, and/or advanced chemistry or physics may be used to satisfy the basic sciences requirement. The basic science requirements are usually satisfied from prior undergraduate work.

Coursework devoted to developing skills in the use of computers or computer programming may not be used to satisfy the mathematics/basic sciences requirement.

*** Engineering Sciences** At least 32 credits.

This requirement is usually satisfied by taking courses in Civil and Environmental Engineering and other departments of the College of Engineering.

*** Engineering Design** At least 16 credits.

This requirement may be satisfied by taking some undergraduate courses in the environmental engineering area. However, the student will need to select engineering design courses in other areas of Civil Engineering. To meet the Environmental Engineering Program capstone design requirement CEE 469 or CEE 486 is required. See Table 2 on the following page for the engineering design and science credit allocations for courses commonly taken to fulfill the basic level requirement.

*** Humanities and Social Sciences** At least 16 credits.

This is usually satisfied from prior undergraduate work.

*** Graduate Requirements**

In addition to the basic level coursework requirements described above, students with a non-engineering baccalaureate must earn a minimum of 31 graduate credits. The requirements are the same as listed under Students with Engineering Baccalaureate - Research Option.

Table 2. Engineering Science and Design Credits for Basic Level Requirements

		Credit Hours	
Course		Engr. Sci.	Engr. Design
CEE 121	CEE Measurements	3	0
CEE 240	Statics	3	0
CEE 241	Strength of Materials I	3.5	0.5
CEE 270	Systems Analysis & Economics for CE	2	1
MIE 230	Thermodynamics I	3	0
ECE 361	Fund. of Elect. Engrg.	3	0
ChE 225	Fundamentals	3	0
CEE 310	Transportation Systems	2	1
CEE 320	Soil Mechanics	2.5	1.5
CEE 331	Structural Analysis	3	0
CEE 342	Dynamics	3	0
CEE 357	Elementary Fluid Mechanics	3.5	0.5
CEE 370	Environmental Engineering Principles	3	0
CEE 371	Water and Wastewater Treatment	1	2
CEE 421	Foundation Engineering	1	2
CEE 423	Engineering Geology	3	1
CEE 432	Advanced Structural Analysis	3	0
CEE 433	Reinforced Concrete Structures	0	3
CEE 434	Design of Steel Structures	0	3
CEE 450	Highway Location and Geometric Design	1	2
CEE 455	Spatial Analysis in Transportation	2	1
CEE 462	Water Resources Engr. & Sustainability	1	2
CEE 469	Water Supply & Wastewater Collection	0	3
CEE 473	Groundwater	2	1
CEE 476	Solid and Haz. Waste Management	2	1
CEE 485	Civil Engineering Construction Methods	1	2
CEE 486	CEE Design Project	0	3
CEE 509	Transportation Systems Analysis	2	1
CEE 510	Public Transportation Systems	2	1
CEE 511	Traffic Engineering	1 ½	1 ½
CEE 515	Pavement Design	½	2 ½
CEE 516	Transportation Design	½	2 ½
CEE 518	Intelligent Transportation Systems	2	1
CEE 523	Ground Improvement	1	2
CEE 525	Environmental Geotechnology	1	2
CEE 535	Matrix Analysis of Structures	3	0
CEE 536	Reinforced Concrete	½	2 ½
CEE 540	Strength of Materials II	2 ½	½
CEE 541	Structural Dynamics	2 ½	½
CEE 548	Finite Element Method - An Introduction	3	0
CEE 549	Structural Stability	2 ½	½

PhD DEGREE

The graduate student and advisor should consult and follow the CEE Department web site regarding requirements and regulations pertaining to the PhD degree (**Regulations Governing the M.S. and PhD Programs of the Department of Civil and Environmental Engineering**). Information on Degree requirements, Committees, Examinations, etc., is described. In addition to the CEE Department regulations, the Environmental and Water Resources Engineering Program has requirements for the major area, minor area, and research skill that are greater and more comprehensive than the CEE Department, and a specific different format for the Ph.D. Comprehensive Examination.

Major Area. There are no specific course requirements. **The student must demonstrate mastery of knowledge in the major area.** Usually, courses taken in the M.S. degree suffice, but in some cases, in consultation with the PhD Committee, the student may be required to take some additional courses.

Course Credits - Minor Area. Completion of a minor or supporting program of 12 credits is required. The goal is for PhD students to support their research and career plans with this coursework. This may involve coursework in one or more academic programs outside of environmental engineering; examples include chemistry, chemical engineering, microbiology, public health, math, statistics, geology, etc..

Course Credits - Research Skill. Completion of 6 credits devoted to a "research skill" such as statistics, numerical methods or advanced computer programming is required. Other courses deemed appropriate by the PhD Committee may also be taken.

Dissertation Credits. The CEE Department and EWRE Program requirements are the same, but are described here for your convenience. A minimum of 18 Dissertation credits (CEE 899 Doctoral Dissertation) must be earned in addition to the minimum total of 18 credits of Minor Area and Research Skill courses specified above.

Comprehensive Examination. To become a Ph.D. candidate, all Ph.D. students must pass a comprehensive examination. This consists of written and oral examinations. The Environmental and Water Resources Engineering Program requires a specific format for this exam as described below.

Written Portion of the Ph.D. Comprehensive Exam

The Ph.D. Comprehensive Exam is conducted in approximately a one week period in three parts. The exam must be taken before the 4th semester after the student begins the PhD Program.

Part 1: Fundamentals of Environmental & Water Resources Engineering

Schedule: Offered each January and June by the EWRE Program. Part 1 of the written portion will typically be given on a Monday of the examination week.

Examining Committee: This exam is administered by the individual student's Ph.D. committee; questions are solicited from all EWRE faculty.

Composition: Three questions, (33% each), one exam for all Ph.D. students who entered the program three semesters prior, this exam will be prepared by all EWRE faculty.

1. Physics of Environmental and Water Resources Engineering
    a. Fluid flow
    b. Mass transport of contaminants
    c. Physical treatment processes

2. Chemistry of Environmental and Water Resources Engineering
    a. Aquatic chemistry
    b. Chemistry of natural aquatic systems (groundwater and surface water)
    c. Chemical treatment processes

3. Biology of Environmental and Water Resources Engineering
    a. Environmental microbiology
    b. Biology of natural systems
    c. Biological treatment processes

Rules: Must pass overall exam (total score $\geq$ 70%), 6 hours total, in-class, closed book, on the same day.

Part 2: Advanced Topics in Environmental and Water Resources Engineering

Schedule: This portion of the written comprehensive exam will typically be handed out on Tuesday morning and is due on Wednesday morning.

Examining Committee: Ph.D. Committee, specific to each student; exam to be administered by the candidate's advisor.

Composition: This portion of the exam is take home, open book, one day working time, prepared by the individual students' Ph.D. Committee and specific to each candidate. All of the committee members should together prepare this portion of the exam.

Rules: A passing grade must be earned on the question.

Oral Portion of the Ph.D. Comprehensive Exam

Schedule: To be taken within two days to one week following completion of the Written portion of the PhD comprehensive exam.

Examining Committee: Ph.D. Committee, specific to each candidate; oral exam to be administered by the candidate's advisor.

Format: The student will respond to oral questions from the committee. The exam is expected to last about two hours. This exam should not be combined with a presentation and defense of the Dissertation Prospectus.

Rules: A passing grade must be earned from all committee members for the overall comprehensive exam. If on the first attempt the student fails to pass, the committee will direct the student to re-take the entire comprehensive exam, or portions thereof, within four weeks of the first attempt. If this second attempt ends in failure, the student will not be allowed to continue.

Teaching and Service

All of the EWRE Program Ph.D. students are encouraged to obtain teaching experience as part of their education. Each student should talk to their advisor about having the opportunity to present lectures in appropriate courses. In addition, the EWRE Program has a philosophy of having everyone work together to help the program. In this regard, both M.S. and Ph.D. students called upon to help with certain program activities.

ADVISING

This section places emphasis on advising for the M.S. degrees, particularly the M.S. in Environmental Engineering. Students who have enrolled in the PhD program should consult the CEE Department website for information (***Regulations Governing the M.S. and PhD Programs of the Department of Civil and Environmental Engineering)***.

Advisor Definitions. Each student is assigned an Advisor upon admission to the Environmental Engineering Program. The Advisor will advise the student on curriculum matters, course registration, and on the Project or Engineering Report.

Initial Registration. New graduate students upon arrival on-campus should schedule an appointment with their Advisor for the purpose of registering for courses for their first semester. It is required that the student with the assistance of the Advisor fill out a plan using the Plan of Study (Appendix A) of how they will fulfill degree requirements for their projected period of study. This plan should be approved by the Advisor and sent to the Program Director for approval within four weeks of the beginning of the student's first semester on-campus. The purpose of the plan is to insure that all students understand degree requirements and have a plan to satisfy them. It is understood that students and faculty will not always know which courses will be taught in the future, and therefore it will not always be feasible to identify courses with specific semesters. What is important is that students have prepared a plan showing in which semester they intend to take specific courses. Please e-mail Jodi Ozdarski (ozdarski@ecs.umass.edu) to request electronic versions of the forms in Appendix A or download them from the web page (http://www.ecs.umass.edu/eve/program/) .

Semester Registration Meetings. Prior to the start of classes each semester, the student should meet with his/her advisor regarding course selection. At this meeting the Plan of Study Form can be updated. As the Form is updated the Advisor should place a current copy in the student's official file which is maintained in the CEE Department office.

Degree Completion Requirements. M.S. and PhD degree students should consult the CEE Department website for procedures to follow and for requirements regarding completion of your degree ***(Regulations Governing the M.S. and PhD Programs of the Department of Civil and Environmental Engineering***). In addition the Environmental and Water Resources Engineering Program has three additional requirements.

*** M.S. Program Summary Form** (Appendix A)

A final typed copy of this form must be prepared and signed by both the student and Advisor. This form should be forwarded to the Graduate Program Director for approval along with the Degree Application/Eligibility Form. Please allow sufficient time for the Program Director to review this material prior to deadlines established by the CEE Department and the Graduate School. Once

approved by the Graduate Program Director, Jodi Ozdarski will forward all necessary documents to the Graduate School.

*** Graduate Data Information Form** (Appendix A) **and Questionaire**

All students should fill out the Graduate Data Information Form as well as the Graduate Student Questionaire and leave these with Jodi Ozdarski.

*** Laboratory and Office Area Clean-up** (Appendix A)

The student is responsible for cleaning up his/her laboratory area. This includes glassware and equipment. Your Advisor should go over this item with you and verify its satisfactory completion prior to signing the University's Degree Application/Eligibility Form. This form must also be forwarded to the Graduate Program Director. Personal belongings in your office area should be removed and personal files on any CEE or EVE Program computers should be deleted. Consult with your advior regarding the need to back-up research project files.

PROFESSIONAL SOCIETIES

Listed below are a number of professional associations related to the Environmental and Water resources Engineering field. In addition, a variety of journals are listed which contain environmental engineering and water resources material. To provide an idea of the types of papers found in each, a number of subject areas are listed with each journal. Many of the associations or journals have student membership rates. The reduced fees provide you with an excellent opportunity to join these professional societies or to purchase the journals. The Program encourages membership and the presentation of research results at professional society conferences.

Associations.

AIR AND WASTE MANAGEMENT ASSOCIATION (AWMA) - publishes Journal of the Air and Waste Management Association, Environmental Management (EM) and other books and periodicals.

AMERICAN CHEMICAL SOCIETY (ACS) – highly respected journal of interest is Environmental Science and Technology; chemistry of air, water, soil, etc.

AMERICAN GEOPHYSICAL UNION (AGU) - publishes Water Resources Research.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) - has a number of different divisions including Environmental Engineering, Water Resources Planning and Management, and Hydraulics, with associated journals.

AMERICAN SOCIETY FOR MICROBIOLOGY (ASM) - publishes Applied Environmental Microbiology.

AMERICAN WATER RESOURCES ASSOCIATION (AWRA) – professional association dedicated to advancements in water resources management, research, and education

AMERICAN WATER WORKS ASSOCIATION (AWWA) – North American association focussed on all aspects of drinking water. Regional organization is the New England Water Works Association.

INTERNATIONAL WATER ASSOCIATION (IWA) – international association covering all aspects of water (drinking, storm, wasdtewater) publishes Water Research, Aqua and other books and periodicals.

NATIONAL GROUND WATER ASSOCIATION (NGWA) - publishes groundwater journals.

WATER ENVIRONMENT FEDERATION (WEF) – North American association focussed on wastewater and stormwater. Regional organization is the New England Water Environment Association; publishes Water Environment Research and Water Environment and Technology.

Journals .

Applied Environmental Microbiology (ASM)
- environmental microbiology; microbiology of water; wastewater microbiology

Environmental Engineering Science
- all aspects of environmental engineering

Environment International
- water quality; water treatment; water resources

Environmental Science & Technology (ACS)
- air and water pollution control processes, aquatic and atmospheric chemistry, water resources, solid wastes, hazardous wastes

Environmental Technology
- all areas of environmental technology and pollution

Environmental Toxicology and Chemistry (SETAC)
- all aspects of environmental toxicology and chemistry

Groundwater (NGWA)
- groundwater quality and quantity

Groundwater Monitoring and Remediation (NGWA)
- groundwater monitoring; groundwater contamination and cleanup

Journal Air and Waste Management Association (AWMA)
- air quality; air pollution control
- solid and hazardous waste management
- environmental remediation

Journal American Water Works Association (AWWA)
- water supply and treatment

Journal of Environmental Engineering (ASCE)

- all areas of environmental engineering are covered

Journal of Environmental Quality (SSSA)
- unsaturated zone contamination
- phytoremediation
- pesticide/herbicide fate and transport

Journal of Hydraulic Engineering (ASCE)
- hydraulics of engineered and natural systems

Journal of the American Water Resources Association (AWRA)
- management and planning for water resources; hydrology
- prior to 1997, known as Water Resources Bulletin

Journal of Water and Health (IWA)
- relatively new international journal with broad coverage

Journal of Water Resources Planning and Management (ASCE)
- modeling and optimization techniques for water resources

Journal of Water Supply: Research and Technology – AQUA (IWA)
- water supply and water quality; water treatment; water distribution

Microbial Ecology (ISME)
- environmental microbiology; microbial ecology; biological treatment

Soil Science Society of America Journal (SSSA)
- soil physics, chemistry and microbiology

Water Environment and Technology (WEF)
- general information and news, wastewater & stormwater oriented

Water Environment Research (WEF)
- wastewater treatment, environmental microbiology, industrial wastes, water pollution

Water Research (IWA)
- water quality and pollution; wastewater treatment

Water Resources Research (AGU)
- management, planning, math modeling, and programming for water resources surface and groundwater hydrology

Water Science & Technology (IWA)
- water quality and pollution; water treatment

Water Well Journal (NGWA)
- written from the well drilling industry perspective

APPENDIX A – COMPUTING FACILITIES

A wide variety of computing facilities are used by EWRE Program Graduate students. Students may use their own PC (desktop or laptop) with access to UMass Office of Information Technology (OIT) and College of Engineering Engineering Computer Services (ECS) networks via hardwire ports in ELab 2 or via wireless network connections. Access to the ECS network requires completion of forms available in the ECS Main office in Marcus Hall. Some students are supplied with, and/or have access to, a PC as part of their research work, either at an office desk or within a research laboratory. Availability generally depends on the nature of the research and budgeted funds.

Students in the EWRE Program can make use of computers located in 12 Marston Hall, the Perrell Lab, as described below. Also, ECS and OIT maintain computers in other rooms around campus. ECS facilities include PCs in Marston 112, Marston 134 and Elab 306 which are linked to ECS servers and the Internet. Access to these machines requires an account on either the ECS system or the OIT system. Also, wireless internet access is available through ECS and OIT at an increasing number of campus locations.

Marston Hall 12 Computer Room (Perrell Lab)

The Perrell Lab is for the exclusive use of graduate students in the Department of Civil and Environmental Engineering and for selected undergraduate students. The Lab contains six computers with full access to the Internet and a server. Input/output devices available in the lab include a scanner, laser printer, color laser printer and color plotter.

Access to Marston 12 requires knowledge of the keypad code. Please see Mary Bisbee to obtain the code. The computers in Marston 12 are linked through a local network. Access to this network requires that you have an account. Please contact the designated student support person (as directed by Dr. Ahlfeld) to setup an account.

The Perrell computers are intended for research, dissertation/theses, and classwork. Usage priorities from highest to lowest are:

Research - computing and word processing for theses, proposals and reports
Class assignments - computing and word processing for classwork
Other work - letters, resumes, personal Web access

Supplies and Maintenance

The need for toner and observations of hardware or software problems should be brought to the attention of the designated student computer assistant or the faculty member responsible for EVE computing facilities. You may also contact ECS staff who provide support for both software and hardware problems on our computers.

The computer room and computers need regular cleaning and maintenance. Please use common sense with regards to cleanliness and food around the computer and printers.

Software

There is a variety of software available on the computers in Marston 12. This includes the Microsoft Office suite and such engineering packages as Fortran compilers, SigmaPlot and AutoCAD. Copying of

software, except public domain software, is illegal. It is the policy of the Civil and Environmental Engineering Department and Environmental Engineering Program that only software obtained legitimately with proper licensing may be used on Department computers.

Most of the software discs and documentation are stored in the locked cabinet in the Perrell Lab.

Personal software and data should not be copied onto the hard disk drives of the PCs. Please utilize CDs, flash memory or zip disks for your own work and delete any unnecessary files from the hard disks.

ELab II Printing

The CEE Department maintains a printer/copier/scanner machine in ELab II Rm 210 (EVE office area). This machine is accessed via the ECS network for printing and scanning. You will be supplied with information needed to download appropriate drivers to utilize the printing and scanning functions. The machine is also a standard photocopier. You must utilize an an appropriate ID number as supplied by your advisor. The ID number is specific to your advisor and/or research project. The machine is not for personal use.

APPENDIX B – PROGRAM FORMS

Examples of the MS EVE Program forms are shown on the following pages. Actual electronic versions of these forms for your use can be obtained by email from Jodi Ozdarski – ozdarski@ecs.umass.edu – or downloaded from the UMass EVE graduate program web pages of the CEE Department web site.

PLAN OF STUDY

University of Massachusetts
Environmental Engineering Program

Master of Science (Research Option)

To Be Completed Within One Month of Entering the Program

Student: Expected Degree Completion Date:

Student No.: Advisor:

Semester Entered Program:

COURSE NUMBER AND TITLE	TOTAL CREDIT	ENGR. DESIGN CREDIT	EXPECTED SEMESTER
REQUIRED COURSES:			
CEE 671 Environmental Biological Processes	4	2	
CEE 672 Physical and Chemical Treatment Processes	4	2	
CEE 691/692 Seminar	1		
CEE 770 Environmental Engineering Design	4	4	
CEE 689 Masters Project (minimum 6 credits)			
ELECTIVE COURSES (500 level or higher):			
TOTALS			
REQUIRED CREDIT TOTALS	31	10	

At least one of the following courses must be taken under the elective course category

- CEE 525 (environmental geotechnology)
- CEE 560 (hydrology)
- CEE 577 (surface water quality modeling)
- CEE 579 (air quality)
- CEE 660 (subsurface hydraulics)
- CEE 661 (subsurface pollution)
- CEE 680 (aquatic chemistry)
- CEE 776 (bioremediation)

PLAN OF STUDY APPROVAL

Student Sign. _____
and date

Advisor's Sign. _____
and date

Prog. Coord. Sign. _____
and date

M.S. Program Summary Form
University of Massachusetts
Environmental Engineering Program

Master of Science (Research Option)

To Be Completed at End of Studies

Student: Expected Degree Completion Date:

Student No.: Advisor:

Semester Entered Program: Thesis/Project Title:

COURSE NUMBER AND TITLE	TOTAL CREDIT	ENGR. DESIGN CREDIT	SEMESTER TAKEN	GRADE
REQUIRED COURSES:				
CEE 671 Environmental Biological Processes	4	2		
CEE 672 Physical and Chemical Treatment Processes	4	2		
CEE 691/692 Seminar	1			
CEE 770 Environmental Engineering Design	4	4		
CEE 689 Masters Project (minimum 6 credits)				
ELECTIVE COURSES (500 level or higher):				
TOTALS				
REQUIRED CREDIT TOTALS	31	10		

At least one of the following courses must be taken under the elective course category

- CEE 525 (environmental geotechnology)
- CEE 560 (hydrology)
- CEE 577 (surface water quality modeling)
- CEE 579 (air quality),
- CEE 660 (subsurface hydraulics)
- CEE 661 (subsurface pollution)
- CEE 680 (aquatic chemistry)
- CEE 776 (bioremediation)

FINAL APPROVAL

Student Sign. _____ and date

Advisor's Sign. _____ and date

Prog. Coord. Sign. _____ and date

PLAN OF STUDY

University of Massachusetts
Environmental Engineering Program

Master of Science (Professional Practice)

To Be Completed Within One Month of Entering the Program

Student: Expected Degree Completion Date:

Student No.: Advisor:

Semester Entered Program:

COURSE NUMBER AND TITLE	TOTAL CREDIT	ENGR. DESIGN CREDIT	EXPECTED SEMESTER
REQUIRED COURSES			
CEE 671 Environmental Biological Processes	4	2	
CEE 672 Physical and Chemical Treatment Processes	4	2	
CEE 679 Engr. Report	3		
CEE 680 Aquatic Chem.	4		
CEE 691/692 Seminar	1		
CEE 770 Envr. Engr. Design	4	4	
A Course:			
B Course:			
TOTALS			
REQUIRED CREDIT TOTALS	31	10	

PLAN OF STUDY APPROVAL

Student Sign. _____
and date

Advisor's Sign. _____
and date

Prog. Coord. Sign. _____
and date

M.S. Program Summary Form
University of Massachusetts
Environmental Engineering Program

Master of Science (Professional Practice)

To Be Completed at End of Studies

Student: Degree Completion Date:

Student No.: Advisor:

Semester Entered Program: Thesis/Project Title:

COURSE NUMBER AND TITLE	TOTAL CREDIT	ENGR. DESIGN CREDIT	SEMESTER TAKEN	GRADE
REQUIRED COURSES				
CE-ENGIN 671 Environmental Biological Processes	4	2		
CE-ENGIN 672 Phy. & Chem. Treatment Processes	4	2		
CE-ENGIN 679 Engr. Report	3			
CE-ENGIN 680 Aquatic Chem.	4			
CE-ENGIN 691/692 Seminar	1			
CE-ENGIN 770 Envr. Engr. Design	4	4		
A Course:				
B Course:				
TOTALS				
REQUIRED CREDIT TOTALS	31	10		

FINAL APPROVAL

Student Sign. _____
and date

Advisor's Sign. _____
and date

Prog. Coord. Sign. _____
and date

PLAN OF STUDY FOR SATISFYING BASIC LEVEL REQUIREMENTS – Pg 1 of 2

University of Massachusetts
Environmental Engineering Program
Master of Science (Research Option)

Student:

This form is to be completed within one month of entering Program by students who do not possess an undergraduate engineering degree.
Instructions: for each category of coursework indicate the courses to be used to meet the requirements. See the Environmental Engineering Program Information, Procedures and Advising Manual for details on these requirements.

Mathematics and Basic Sciences Must include calculus through differential equations, a probability and statistics course, at least a 2 course sequence in general chemistry, and a 2 course sequence in calculus based physics.

Institution at Which Course Was Taken	Course Name and Number	Semester Credits Awarded	Semester/ Qtr. Taken	Grade
Total Credits (32 required)				

Humanities and Social Sciences

Institution at Which Course Was Taken	Course Name and Number	Semester Credits Awarded	Semester/ Qtr. Taken	Grade
Total Credits (16 required)				

PLAN OF STUDY FOR SATISFYING BASIC LEVEL REQUIREMENTS – Pg 2 of 2

University of Massachusetts
Environmental Engineering Program
Master of Science (Research Option)

Student:

Engineering Science and Design For courses taken at institutions other than the University of Massachusetts documentation of engineering science and design content must be provided. To meet the Environmental Engineering Program capstone design requirement, CEE 469 is required.

Institution at Which Course Was Taken	Course Name and Number	Semester Credits		Semester/ Qtr. Taken	Grade
		Engineering Science	Engineering Design		
UMass	CEE 469 Water Supply and Wastewater Collection	0	3		
Total Credits					
Required Credit Totals		32	16		

PLAN APPROVAL (submit within 1 month)

Student Sign _____
and date

Advisor's Sign. _____
and date

Prog. Coord. Sign. _____
and date

RECORD OF COURSES TO SATISFY BASIC LEVEL REQUIREMENTS – Pg 1 of 2

University of Massachusetts
Environmental Engineering Program
Master of Science (Research Option)

Student:

This form is to be completed at the beginning of the last semester of studies by students who do not possess an undergraduate engineering degree.
Instructions: for each category of coursework indicate the courses to be used to meet the requirements. See the Environmental Engineering Program Information, Procedures and Advising Manual for details on these requirements.

Mathematics and Basic Sciences Must include calculus through differential equations, a probability and statistics course, at least a 2 course sequence in general chemistry, and a 2 course sequence in calculus based physics.

Institution at Which Course Was Taken	Course Name and Number	Semester Credits Awarded	Semester/ Qtr. Taken	Grade
Total Credits (32 required)				

Humanities and Social Sciences

Institution at Which Course Was Taken	Course Name and Number	Semester Credits Awarded	Semester/ Qtr. Taken	Grade
Total Credits (16 required)				

RECORD OF COURSES TO SATISFY BASIC LEVEL REQUIREMENTS – Pg 2 of 2

University of Massachusetts
Environmental Engineering Program
Master of Science (Research Option)

Student:

Engineering Science and Design For courses taken at institutions other than the University of Massachusetts documentation of engineering science and design content must be provided. To meet the Environmental Engineering Program capstone design requirement, CEE 469 is required.

Institution at Which Course Was Taken	Course Name and Number	Semester Credits		Semester/ Qtr. Taken	Grade
		Engineering Science	Engineering Design		
UMass	CEE 469 Water Supply and Wastewater Collection	0	3		
Total Credits					
Required Credit Totals		32	16		

FINAL APPROVAL

Student Sign _____ and date

Advisor's Sign. _____ and date

Prog. Coord. Sign. _____ and date

University of Massachusetts Environmental Engineering Program

Course Planning Form – Chronological Basis

Student: _____ Program Entry Semester: _____

Semester:			**Semester:**		
	Credits			**Credits**	
Course No. & Title	**Tot.**	**ED[1]**	**Course No. & Title**	**Tot.**	**ED**
Semester:			**Semester:**		
	Credits			**Credits**	
Course No. & Title	**Tot.**	**ED**	**Course No. & Title**	**Tot.**	**ED**
Semester:			**Semester:**		
	Credits			**Credits**	
Course No. & Title	**Tot.**	**ED**	**Course No. & Title**	**Tot.**	**ED**

[1]ED = Engineering Design

GRADUATE DATA INFORMATION FORM

Name:

Thesis/Project/Report Title:

Advisor:

Date of Defense:

Initial Position:
(Title/Address/Phone Number)

Forwarding Address:

UMass Amherst Department of Civil and Environmental Engineering

Form CEE.9 - Graduate Student Final Check-Out List

Graduate Student Check-Out List

Student Name and Number _____

Degree Achieved/Area _____

1. Degree Eligibility Form Completed: _____
2. Degree Eligibility Form Approved by Chairperson: _____
3. Key(s) turned in: _____
4. Project/Thesis/Report/Dissertation submitted: (date) _____
5. Library books turned in: _____
6. Area/Professors personal books returned: _____

7a. Study area cleaned: _____ Room # _____ Desk # _____

7b. Lab area cleaned: _____ Room # _____ **Advisor's Initial** _____

7c. Computer files removed: : _____ Room # _____ **Advisor's Initial** _____

8. All "incomplete" grades changed: _____
9. Forwarding address: _____

_____

SIGNED:

_____ Date: _____
Student - Items 5,6,9

_____ Date: _____
Key Return – Item 3

_____ Date: _____
Academic Assistant - Items 1,2,4,7,8