The Doctor of Philosophy (Ph.D.) degree is a research-oriented degree requiring a minimum of 64 semester credit hours of approved courses and research beyond the Master of Science (M.S.) degree [96 credit hours beyond the Bachelor of Science (B.S.) degree]. The university places limitations on these credit hours in addition to the requirements of the Department of Civil Engineering and the Environmental Engineering program listed below. A complete discussion of all university requirements is found in the current Texas A&M University Graduate Catalog (available on the Internet at http://www.tamu.edu/admissions/catalogs/) under the heading “The Degree of Doctor of Philosophy.” For example, university requirements include a preliminary examination, a final examination, and submission of a dissertation to the university.

NOTE: All documents requiring departmental signatures must be submitted to the Civil Engineering Graduate Office at least one day prior to the Office of Graduate Studies deadline.

In addition to fulfilling the University requirements for the Doctor of Philosophy (Ph.D.) degree, a student enrolled in the Civil Engineering graduate program in the area of Environmental Engineering must satisfy the following department requirements.

• A minimum of 32 credit hours of graduate level coursework taken through Texas A&M University or equivalent university [a minimum of 24 credit hours if the student already has taken at least another 24 credit hours of graduate course work for the Master of Science (M.S.) or Master of Engineering (M.E.) degree].

• Remaining coursework requirement can be met by 32 hours of CVEN 691.

The student must also satisfy the following area requirements and/or recommendations described below:

• Qualifying Exam: Once per year in January, a Qualifying Examination will be scheduled with members of the Environmental Engineering faculty. The exam will include both written and oral components. Students entering the program in the Fall semester are expected to take the exam the following January. Students entering in the Spring or summer semesters are expected to take the next available exam.

• Degree Plan: An advisory committee must be formed and a Degree Plan must be submitted and approved by the advisory committee after passing the Qualifying Exam and by the end of the second semester (Fall or Spring) of study. The proposed degree plan must be typed on the official form as it appears on the Internet at http://ogs.tamu.edu/ with endorsements by the student’s advisory committee.

• Written Preliminary Exam: After completion of the coursework listed on the Degree Plan (with the exception of CVEN 691 Research), but no later than the end of the fifth semester (Fall or Spring) of study, a Written Preliminary Examination will be scheduled with members of the advisory committee. This exam consists of written questions from the advisory committee. The exam in total should be given over a period of one week.
• Research Proposal: As soon as the research project can be outlined in reasonable detail, but no later than the end of the fifth semester (Fall or Spring) of study, the dissertation research proposal should be completed. The Research Proposal should describe the proposed research, including relevant background information, and clearly demonstrate how this research will make a unique contribution of new knowledge to the student’s area of study. Upon approval of the Research Proposal by the advisory committee chair, the Research Proposal must be submitted to other members of the advisory committee at least 2 weeks (10 working days) prior to the Oral Preliminary Exam.

• Oral Preliminary Exam: The Oral Preliminary Examination will be scheduled with members of the advisory committee at the time the Written Preliminary Examination is scheduled. The Oral Preliminary Examination is to occur within two weeks of having taken the Written Preliminary Examination. At the Oral examination, the student will give a presentation of their Research Proposal. The questions in this exam will cover the Written Preliminary Exam, the Oral Preliminary Exam presentation, and any relevant coursework.

• Completion of Dissertation: Upon approval of the Dissertation by the advisory committee chair, the Dissertation will be submitted to the other members of the advisory committee at least 2 weeks (10 working days) prior to the Final Defense.

• Final Defense: A Final Defense consisting of an oral examination will be scheduled with all of the advisory committee members. At this examination, the student will give a presentation of the research work completed for the degree and documented in the Dissertation. The student is encouraged to invite other interested individuals to the research presentation.

Recommended Coursework
As noted above, the coursework included in the Degree Plan must be approved by the student’s advisory committee. Suggested courses that may be considered for inclusion in the Degree Plan are listed below.

Ph.D. Level Environmental Engineering Courses
The following courses are a complete listing of the Environmental Engineering courses offered. Due to the diverse backgrounds of graduate students entering the program, courses should be selected to ensure the foundation coursework has been completed prior to taking more advanced courses. Ph.D. students are expected to have either taken the core classes (or their equivalent) or deficits will be filled in their degree plans. Coursework outside the department must be approved by the committee and meet the University restrictions to be included in the degree plan.

ENVIRONMENTAL ENGINEERING GRADUATE PROGRAM @ TEXAS A&M
May 2005
<table>
<thead>
<tr>
<th>Course</th>
<th>MS or PhD</th>
<th>Frequency (per year)</th>
<th>Comments</th>
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<tbody>
<tr>
<td>CVEN 601 III Environmental Engineering Processes</td>
<td>MS/ME</td>
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<td>Core class</td>
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<tr>
<td>CVEN 619 I Environmental Engineering Processes</td>
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<td>CVEN 620 II Environmental Engineering Processes</td>
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<td>CVEN 603 Management Environmental Engineering</td>
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<tr>
<td>CVEN 604 Engineering Analysis of Treatment Systems</td>
<td>MS/ME</td>
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<td>CVEN 605 Environmental Measurements</td>
<td>MS/ME</td>
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<td>CVEN 606 Environmental Engineering Design I</td>
<td>MS/ME, PhD/DE</td>
<td>Var</td>
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<td>CVEN 609 Environmental Control of Oil and Hazardous Materials</td>
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<td>CVEN 610 Environmental Risk Assessment</td>
<td>ME/ME, PhD</td>
<td>1/3</td>
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<td>CVEN 682 Environmental Remediation of Contaminated Sites</td>
<td>MS/ME, PhD</td>
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<td>CVEN 681 Environmental Seminar</td>
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<td>CVEN 684 Professional Internships</td>
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<td>CVEN 685 Directed Studies</td>
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<td>CVEN 689 Special Topics</td>
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<tr>
<td>CVEV 691 Research</td>
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</tbody>
</table>

**Other Suggested CVEN Courses**

Relevant Geotechnical or Ocean Engineering courses w/pre-requisites.

**Other Suggested STAT Courses**

STAT 601 Statistical Analysis
STAT 602 Statistical Methods of Regression Analysis

**Water Resources Courses**

CVEN 627 Engineering Surface Water Hydrology
CVEN 628 Advanced Hydraulic Engineering
CVEN 658 Civil Engineering Applications of GIS
CVEN 664 Water Resources Engineering Planning and Management
CVEN 665 Water Resources Systems Engineering
CVEN 673 Transport Through Porous Media
CVEN 674 Groundwater Engineering
CVEN 675  Stochastic Hydrology
CVEN 679  Theory of Fluid Mechanics Models
CVEN 680  Advanced Computation Methods for Fluid Flow
CVEN 688  Computational Fluid Dynamics

**Other Classes**
ATMO 602  Principles of Atmospheric Physics and Chemistry
ATMO 613  Advanced Atmospheric Chemistry
BICH 601  Fundamentals of Biochemistry I
BAEN 651  Geographic Information Systems
BAEN 652  Advanced Topics in GIS
BAEN 669  Water Quality Engineering
BAEN 670  Air Pollution Engineering
BAEN 672  Small Watershed Hydrology
BAEN 673  Modeling Small Watersheds
BIOL 650  Genomics
BIOT 601  Biotechnology Principles and Techniques I
BIOT 602  Biotechnology Principles and Techniques II
CHEN 651  Biochemical Engineering
CHEN 629  Transport Phenomenon
CHEN 624  Chemical Engineering Kinetics and Reactor Design
OCEN 678  Fluid Dynamics for Ocean and Environmental Engineering
GEOL 621  Contaminant Hydrogeology
GEOL 641  Environmental Geochemistry
MATH 601  Methods of Applied Math
MATH 602  Partial Differential Equations
MATH 609  Numerical Analysis
RLEM 601  Rangeland Resource Management
RLEM 601  Ecology and Land Uses
RLEM 640  Wetland Delineation
RENR 650  Leadership Development and Management of Environmental NGOs
RENR 659  Ecological Economics
RENR 660  Environmental Impact Analysis for Renewable Natural Resources
RENR 662  Environmental Law and Policy
RENR 664  Coastal Zone Management
AGRO 614  Biodegradation and Bioremediation (VAPH 614)
AGRO 615  Reclamation of Drastically Disturbed Lands
AGRO 616  Land Disposal of Waste
AGRO 670  Basic Environmental Toxicology
WFSC 628  Wetland Ecology