Department of Environmental Sciences and Engineering
University of North Carolina at Chapel Hill
Master of Science in Environmental Engineering (MSEE) Degree Requirements

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Program Website
http://sph.unc.edu/envr/1yrmsee/

Engineering Faculty
The following faculty are associated with the environmental engineering program.
Professors Aitken*, Bartram, Characklis*, Coronell*, Kolsky*, MacDonald Gibson*, Serre*, Sobsey, Surratt, Turpin*, Weinberg, West*, and Vizuete*
* faculty who hold engineering degrees or equivalent

Learning Objectives
Upon satisfactory completion of an MSEE degree in ESE, graduates will be able to:

1) Identify environmental engineering problems, needs, and objectives;
2) Evaluate problems quantitatively using measurements and models of environmental media (e.g., air, soil, and water);
3) Develop and design appropriate controls and facilities to solve environmental engineering problems;
4) Evaluate the success of environmental engineering designs and assess the uncertainty involved; and
5) Demonstrate written and oral communication skills related to environmental engineering.

Success in achieving these learning objectives is measured by the successful completion of all degree requirements, including formal course work and a comprehensive oral examination, at which time the master's technical report is presented and defended. Students may also prepare other reports; present their work at seminars and at national or international meetings; and publish in the peer-reviewed literature.

Degree Requirements
Students may be admitted to the MSEE degree program if they have completed an undergraduate curriculum in engineering from an ABET-accredited program or from a foreign institution with an equivalent program. Once admitted, the following requirements must be met:

(1) Students and their advisors should develop a written coursework plan during the first semester of study.

(2) Students must complete at least 12 hours of engineering coursework offered in the Department of Environmental Sciences and Engineering (see attached list) or graduate-level engineering courses from another institution. Courses taken at another institution must be approved by the student's advisor, and must not have counted toward an undergraduate

degree elsewhere, if they are to count towards this requirement.

(3) Students who have not already had an undergraduate or graduate course in probability and statistics and an undergraduate or graduate course in the biological sciences must take an appropriate course on each topic while in the MSEE program. The acceptability of courses to fulfill these requirements should be decided after consultation with the student's advisor.

(4) MSEE student committees for the Technical Report must include at least two members from among the environmental engineering faculty. At least one committee member must hold a degree in engineering as noted in the list of engineering faculty.

(5) MSEE students must meet all other requirements of the Department, Gillings School of Global Public Health and the Graduate School. These requirements include:

- ENVR 400, ESE Seminar (1 credit) (Departmental requirement)
- A course in the principles of public health (3 credits) (School requirement)
- A course in epidemiology for environmental scientists (3 credits) (School requirement)
- A minimum of three credits for ENVR 992, Master's Technical Report (Graduate
- School requirement)
- A minimum of 24 credits in formal coursework (excludes credits for research, ENVR 400, ENVR 992) (Departmental requirement)
- A minimum of 12 credits in formal coursework must be an engineering elective (Departmental requirement)
- A minimum of 30 credits NOT including ENVR 400 (Graduate School and Departmental requirements)
- A minimum of 24 credits in residence; i.e., credit obtained through registration at UNC-CH (Graduate School requirement)

(6) In accordance with Graduate School rules, up to six credits toward the MSEE degree requirements can be transferred from graduate courses taken at a previously-attended institution if the course(s) were not counted toward requirements for the undergraduate degree.

Requirements for a Master's Technical Report (Prior to Fall 2018)
Students are required to prepare a single technical report which:

- Identifies an environmental engineering problem
- Identifies alternative solutions and selects the most suitable engineering solution
- Describes the implementation of an engineering solution

This Technical Report is prepared through 3 technical briefs (each of 12-20 pages length, double-spaced, exclusive of references) through enrollment in ENVR 990.

Problem Identification Brief (approximately 1.0 credit-hour): This written brief defines a relevant *environmental engineering problem* with sufficient precision that engineering solutions may be developed to address it. The design brief may require field work, data collection and analysis.

Solution Identification Brief (approximately 1.0 credit-hour): Written description of an *engineering solution* to the problem identified in the Problem Identification Brief. This brief

will describe a range of technical options and a recommendation as to the preferred solution, with sufficient precision that implementation plans could subsequently be developed. The proposal may include a range of measures (e.g. institutional, legal, financial, and communications activities) complementing technical ones.

Implementation Brief (approximately 1.0 credit-hour): This brief constitutes a written *implementation plan* for the environmental engineering proposal or intervention, showing ***how*** the solution can be most effectively implemented. This will require estimation of resource requirements, scheduling, costing, and resolution of technical issues of implementation.

Progress towards the Engineering Briefs is assessed by the supervisor through ENVR 990. All three briefs are reviewed and assessed by the problem supervisor, (analogous to Research Credits in other degrees in the department.)

MSEE Technical Report (3.0 credit-hours): An integrated Technical Report that combines in a clear and coherent fashion the work performed in the three individual project elements (problem, solution, and implementation briefs), will be submitted to a faculty committee. You must work with your advisor to pick a faculty committee. The faculty committee must consist of three members, one of which is your advisor. Two of the committee must be faculty in the department and at least one must be a member of the engineering faculty listed above.

In the Technical Report the engineering significance of the project must be made apparent. In addition to the Technical Report, the project will be presented orally as part of the final comprehensive examination. Public notice of the examination must be given at least one week in advance of the event.

Requirements for a Master's Technical Report (Fall 2018 and after)
Students are required to take the experiential course Environmental Crisis Management offered in Summer Semester I. This will be a culminating experience that features a multi-disciplinary team and a real-time simulation of environmental and humanitarian emergencies such as a train derailment, major chemical spill, disease outbreak, or population displacement.

MSEE Technical Report (3.0 credit-hours): An integrated Technical Report that combines in a clear and coherent fashion the work performed during the Environmental Crisis Management course. In addition to the Technical Report, the project will be presented orally as part of the final comprehensive examination at the end of the summer course.

Courses in ESE

The courses listed below show the Engineering electives that can be chosen and other courses in ESE that may be of interest to students in the MSEE program. Note that the General electives do not count toward the 12 hours of engineering coursework required for the MSEE degree

Semester	Course Number	Course Title	Credits	Instructor	Area	Elective
Fall	416	Aerosol Physics and Chemistry	3	Surratt	Air	Engineering
Fall	675	Air Pollution Chemistry and Physics	3	West	Air	Engineering
Fall	775	Global Climate Change: Interdiscplinary perspectives	1	West	Air	General
Fall	419	Chemical Equilibria in Natural Waters	3	Coronell	Water	General
Fall	453	Groundwater Hydrology	3	Miller	Water	Engineering
Fall	755	Analysis of Water Resource Systems	3	Characklis	Water	Engineering
Fall	890-01	Basic Hydraulics for Environmental Engineering	3	Kolsky	Water	Engineering
Fall	411	Laboratory Techniques and Field Measurements	3	Weinberg	Water/Air	General
Fall	451	Elements of Chemical Reaction Engineering	3	Vizuete	Water/Air	Engineering
Fall	468	Advanced Functions of Temporal GIS	3	Serre	Water/Air	Engineering
Fall	570	Methods Of Environmental Decision Analysis	3	MacDonald Gibson	Water/Air	Engineering
Fall	666	Numerical Methods	3	Miller	water/Air	Engineering
Fall	671	Environmental Physics 1	3	Miller	Water/Air	Engineering
Fall 2017 only	582	Sanitation in Developing Countries	3	Kolsky	Water	General
Spring	433	Health Hazards of Industrial Operations	3	Flynn	Air	General
Spring	575	Global Climate Change: Science, Impacts, Solutions	3	West	Air	General
Spring	773	Modeling Atmospheric Chemistry	3	Vizuete	Air	Engineering
Spring	682	Water, Sanitation, Hygiene, and Global Health	3	Bartram/Sobsey	Water	General
Spring	685	Water and Sanitation Policy in Lesser Developed Countries	3	Whittington	Water	General
Spring	756	Physical/Chemical Treatment Processes	3	Coronell	Water	Engineering
Spring	785	Public Investment Theory	3	Whittington	Water	General
Spring	788	Managing Environmental Financial Risk	3	Characklis	Water	General
Spring	403	Environmental Chemistry Processes	3	Surratt	Water/Air	General
Spring	470	Environmental Risk Assessment	3	MacDonald Gibson	Water/Air	General
Spring	672	Environmental Physics 2	3	Miller	Water/Air	Engineering
Spring	759	Multiphase Transport Phenomena	3	Miller	Water/Air	Engineering
Spring	765	Space Time Exposure Mapping and Risk Assessment	3	Serre	Water/Air	Engineering
Spring	850	Surface Water Quality:Modeling and Policy	3	Characklis	Water/Air	Engineering
Summer 2018 only	710	Environmental Process Biotech	3	Aitken	Water	Engineering