

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

TRACKS

Environmental Chemistry
Toxicology
Environmental and Occupational Health

APPLICATION REQUIREMENTS

The Department of Environmental Health Sciences offers M.S. and Ph.D. programs in Environmental Chemistry, Toxicology, and Environmental and Occupational Health. Applicants to either the M.S. or Ph.D. program are expected to hold a baccalaureate degree with a combined total of at least 42 credits in biology, chemistry, and mathematics. On a case by case basis, consideration will be given to other undergraduate backgrounds. Consultation with the program is recommended prior to submitting an application. Applicants are required to submit official scores of the Graduate Record Examination aptitude test; the advanced test in chemistry, physics, or biology is recommended. A minimum score of 600 on the TOEFL (or 250 on the computerized test) is required of all international students. Applicants must specify whether they plan to study Environmental Chemistry, Toxicology, or Environmental and Occupational Health.

DEGREE PROGRAMS

The requirements for degrees in Environmental Chemistry, Toxicology, and Environmental and Occupational Health differ in courses that are required but are otherwise very similar. In each program the student takes the core courses required by the track during the first year. During this period the student becomes familiar with the research interests of the faculty and selects an advisor for the Ph.D. dissertation or M.S. thesis work. The overall requirements for the M.S. and Ph.D. programs are described in the following sections followed by the specific requirements for each track:

PROGRAM LEADING TO THE MASTER OF SCIENCE (M.S.) DEGREE

The M.S. program is designed to develop advanced skills, critical thinking, and a sound understanding of the fundamentals in the disciplines of Environmental Chemistry, Toxicology, or Environmental and Occupational Health. The program prepares students for technical and analytical careers in the environmental sciences working in the public or private sectors. A minimum of 36 graduate credits is required to complete the program. The M.S. program offers two routes to the degree, requiring either a technical thesis or a research-based thesis.

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Program of Study and Research (36 credits, minimum)

1. Core courses, 12-13 Credits. Each of the three areas of specialization requires a specific set of core courses. See specific requirements in this document under each program description.
2. Supporting courses as approved by advisor and thesis committee, 6 credits minimum.
3. EHT 675 Responsible Conduct of Scientific Research, 1 credit.
4. EHT 780, 1 credit
5. Master's thesis research, EHT 699, 16 credits minimum.
6. Satisfactory completion of a master's major field examination.
7. Satisfactory seminar on and defense of master's technical thesis or thesis of laboratory, field, or library research.

Technical Thesis

The program is expected to be completed within eighteen months and will include full-time studies during the summer session. Students are required to take a total of 16 credits of EHT 699. Each credit is equivalent to three hours per week in the laboratory or field. The track coordinator or designee will work with each student to select 1-3 laboratories or field assignments in which to gain advanced technical experience in the chosen field. Each individualized training session will be 2-6 months in duration, depending upon the number of placements selected. The student is required to take detailed notes of all experiments performed, using a standard format, and will be required to present a written technical thesis at the end of the 16 credit course. The thesis should include, where applicable, descriptions of the principles and procedures for the techniques involved, quality assurance issues for data acquisition, and statistical analysis, as well as publication-quality presentation of the data obtained.

At the conclusion of all training sessions, the student will make an oral presentation (30-60 minutes) to the thesis committee and other members of the laboratories involved in the technical training. The student will receive a grade of Satisfactory or Unsatisfactory based on the performance in the laboratories or field, the quality of notes, the written technical thesis, and the final oral presentation.

Research Thesis

Masters students pursuing the research thesis are required to take the Major Field Exam. This exam will be administered by the thesis committee, and will be in the student's area of proposed research. The examination consists of an oral defense of a written research proposal prepared by the student. The proposal should outline the background and conduct of proposed thesis research, and include an abstract, specific aims, background and significance, preliminary data (if any), experimental designs and methods, and a bibliography. The research proposal will be judged on standard criteria, including, but not limited to, the student's grasp of the field, significance of the proposed work, and feasibility of the experimental approach. The exam will be taken no later than the semester prior to the defense of thesis, and may be retaken once.

Thesis Committee

Technical Thesis: The thesis committee will consist of a minimum of three faculty members, with the track coordinator or designee being the chairperson. The other members of the committee will include faculty members directly involved in the supervision of the technical training.

Research Thesis: The thesis committee will be selected by the student in consultation with the advisor, and will comprise the advisor and two additional faculty members, and will be approved by the Graduate Academic Committee. Thesis committee selection should be completed by the end of the second semester of study.

PROGRAM LEADING TO THE DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE

The doctoral program in Environmental Health Sciences is designed to prepare students for scholarly and professional positions and careers in academic institutions, public agencies, and industry. The program emphasizes the application of biological, physical, and medical sciences to the solution of environmental and public-health problems. The objective of doctoral study is to develop each student's ability to conduct original, advanced research as an independent scientist. In keeping with this goal, each student is expected to guide his or her own research project, under the supervision of a faculty member, with a high level of effort and accomplishment, and thereby gain the capacity to be self-teaching and the ability to design and conduct research on important issues in the student's chosen field. The program typically entails four or more years of full-time study and research beyond the baccalaureate.

Program of Study and Research (66 credits, minimum)

1. Core courses, 15-16 credits. Each of the three areas of specialization requires a specific set of core courses. See specific requirements in this document under each program description.
2. Supporting courses as approved by advisor and dissertation committee, 12 credits minimum.
3. EHT 675 Responsible Conduct of Scientific Research, 1 credit (may count toward elective credit)
4. BMS 510 Communication in Science, 2 credits (may count toward elective credit)
5. EHT 790 Seminar, 4 credits. One semester of EHT 780 will be substituted.
6. Dissertation research: EHT 898 and EHT 899: 35 credits combined. EHT 898 is taken by students not yet admitted into candidacy for the degree. EHT 899 is required of all students admitted into candidacy for the degree.
7. A minimum of one year in residence.
8. Satisfactory seminar and defense of an approved doctoral dissertation based on laboratory or field research.

Academic Standards: All students are expected to remain in good academic standing during the course of their study, i.e. maintain at least a B average and obtain a grade of satisfactory (S) in all credit requirements for the graduate degree. A student whose record falls below these standards will either be placed on probation or academically dismissed. A student on probation for more than one semester may have their University stipend and/or tuition scholarship withdrawn. A student whose record falls much below these standards at any time or whose performance otherwise indicates a lack of ability or effort needed to succeed in the graduate program will be denied permission for further study.

Tuition Policy: The Department of Environmental Health Sciences will provide tuition scholarships to eligible doctoral students for a maximum of 66 credits. All students are expected to complete 60 credits by the end of the third year of study and be admitted into candidacy.

Admission to candidacy: A student is admitted to candidacy for the degree of Doctor of Philosophy upon meeting the following standards:

1. A minimum of a B average. *
2. Completion of course requirements.
3. Satisfactory completion of the Research Tool Requirement.
4. Satisfactory completion of both Parts of the Qualifying Exam.
5. Completion of University Residence Requirement.
6. Completion of any additional requirements specified in the University Graduate Bulletin.

* If a student gets a grade of C+ or lower in a required course, he/she must retake the course.

Residency Requirement: The residency requirement for all doctoral students will be 7 credits minimum per semester. Per the University at Albany Graduate Bulletin, this requirement is designed to insure for each doctoral student a sustained period of intensive intellectual growth. For this purpose a student will enroll for the required number of credits taken in each of two sessions, not necessarily consecutive, which must be completed satisfactorily.

Statistics Requirement: Students will normally take Epi 552: Principles of Statistical Inference I (3). Under some circumstances (such as a scheduling conflict) a student may substitute a course that has been approved by the Department's Academic Committee and Chair. At present, the only approved alternative courses are Psy 530, Statistical Methods I (3) and NEU 608 Biostatistics (3) at Albany Medical College.

School of Public Health Student Poster Day Requirement: Participation in the annual School of Public Health Student Poster Day is required of all students in their second year of study and beyond. Students who fail to present in the Student Poster Day will receive a grade of

Unsatisfactory on thesis or dissertation research for the spring semester.

Advisement: Each student will be assigned a temporary faculty advisor upon entering the program. The advisor, in most cases the track coordinator, will meet with the student whenever necessary to advise on course selection, advanced standing, course waivers, examination waivers, and selection of thesis/dissertation advisors. The Graduate Academic Advisement form must be completed and signed by the student and the advisor. Any changes (including courses dropped or added after the start of the semester), can be made **ONLY** with the written approval of your advisor, by completing a new advisement form. This form will become a part of the student's file.

Recommendations concerning advanced standing, and course and examination waivers will be submitted to the Graduate Academic Committee and Department Chair for approval prior to submission to the Office of Graduate Studies at the University.

Students matriculated in the Department of Environmental Health Sciences are not permitted to be concurrently matriculated in any other academic department.

Doctoral students should adhere to the following timetable:

Dissertation Advisor - selected at end of 1st semester of study
Preliminary Examination - completed at end of 2nd semester of study
Dissertation Committee - formed at start of 3rd semester of study
Qualifying Examination Part I - completed at end of 3rd semester of study
Qualifying Examination Part II - completed at end of 5th semester of study
Research Tool Requirement - completed by end of 3rd year of study
Admission to Candidacy - completed by end of 3rd year of study

Dissertation Advisor and Committee: By the end of the first semester, the Ph.D. Dissertation Advisor must be selected. After selecting a dissertation advisor, the student together with the advisor will select a **dissertation committee, which must be formed by the start of the third semester of study.** The Dissertation Committee is chaired (in the usual case) by the research mentor (a non-voting member except in the event of a tie) and is comprised of at least four other members - two faculty members from the student's track, one faculty member outside the program area and one member whose primary academic appointment is outside the EHS Department, and who may be from another institution. The composition of the Ph.D. Dissertation Committee will be reviewed by the Graduate Academic Committee and Department Chair for final approval.

Preliminary Examination: Before the end of the second semester of study an oral examination will be conducted and graded by a three member committee comprised of a member of the academic committee and two faculty members from the student's track. The examination will consist of two parts: 1) questions selected from two recent journal articles and 2) general environmental chemistry/toxicology questions which include, but are not limited to, the core course materials,

laboratory rotations, and prospective thesis research. On the basis of the student's performance in the preliminary examinations and grades in courses, the Graduate Academic Committee will recommend that (1) the student continue in the Ph.D. program, (2) the student shall retake the examination once, at a time specified by the examination committee but no later than the end of the following semester, (3) the student shall enter the M.S. degree program, or (4) the student shall leave the department. A student who fails to pass on the second try will be required to take an M.S. degree or leave the department. Students directed to take an M.S. degree will not be permitted to re-enter the Ph.D. program, but may apply for admission after completing the M.S. degree.

Qualifying Examination, Part 1 : Each student who has passed the preliminary examination will be examined by the student's Dissertation Committee **by the end of the third semester of study.** This examination will be in the major area of the anticipated research specialization. Each committee member will provide one written question to the student, with all questions being provided at the same time. The student will have one week to write a response to all questions. Each written response should be double-spaced typed pages. The student may use all of the resources of the library in formulating responses to the questions, but should not obtain help from other faculty members or students. The student will, shortly after submission of the answers, complete an oral examination, administered by the Dissertation Committee. The committee will assign a pass/fail grade to the student. A student who fails may be reexamined within one semester with the scope of the examination being determined by the committee. A student who fails to pass on the second try will be required to take an M.S. degree or leave the department. Part 1 of the Qualifying Examination must be passed before proceeding to Part 2.

Qualifying Examination, Part 2: **This examination must be completed by the end of the fifth semester of study.** The examination consists of an oral defense of a written research proposal prepared by the student. The proposal and the oral defense will be evaluated by the Dissertation Committee (Pass/Fail). The exam will test the student's depth of knowledge in his/her chosen area of specialization as well as his/her ability to write and defend a research proposal. This examination is to be on a topic intended to serve as the basis for the student's Ph.D. dissertation research.

The research proposal should be a detailed document outlining the background and conduct of the proposed dissertation research, which should be designed to answer a significant question in Environmental Health Sciences. The student will write the proposal in the format of a NIH research grant application, following the page limitations currently in effect (and excluding budgetary sections). The proposal should include an Abstract, Specific Aims, Background and Significance, Preliminary Data (***if any - preliminary data is not required***), Experimental Designs and Methods, and a Bibliography. The student may consult with anyone in the course of preparing the proposal, but the written document must represent the student's own work. The mentor may aid in the development of specific aims and construction of a topical outline for the dissertation proposal. The mentor also may direct the student to relevant literature and may edit an initial draft. However, the mentor should not act as co-author. The research proposal will be judged on standard criteria, including, but not limited to, the student's grasp of the field, significance of the proposed work, originality and depth of thoughts and the feasibility of the experimental approach. The proposal will

be submitted to the committee at least **one month** prior to an oral presentation of the proposal to the Dissertation Committee.

At the oral defense, the student will answer questions on the proposal and on related topics; the questions will focus on (but are not restricted to) the student's program area. The exam will be administered by the student's Ph.D. Dissertation Committee, chaired by the dissertation advisor. The student must pass the exam by a majority vote of the Committee. The data and results of the exam will be communicated by the Dissertation Committee Chair to the Department Chair. If the student does not satisfactorily complete this part of the exam, the Dissertation Committee will make appropriate recommendations, which may include modifying the proposal and re-taking the exam, completing remedial course work, or dismissal from the program. If the recommendation is to retake the exam, it must be completed within three months.

Dissertation research, role of the Ph.D. dissertation committee: The student's Dissertation Committee will meet regularly with the student throughout the course of his/her dissertation research to evaluate progress and advise. It is the responsibility of the Dissertation Committee Chair to ensure that the candidate schedule these periodic reviews once yearly. A Doctoral Student Annual Review form, including a brief progress report summarizing each periodic review, should be submitted by the Committee Chair to the Department Chair shortly after the meeting. These reports will become part of the student's academic file.

The Dissertation Committee also is responsible for evaluating and accepting the final written dissertation and conducting the student's oral dissertation defense. The completed thesis must be submitted to the committee at least **one month** before the oral defense. A shorter interval is permissible only if all committee members agree. It is the student's responsibility to arrange a date for the defense that is acceptable to the committee members, and to adhere to the one month interval. In the event that revisions to the dissertation are required, the committee will have two weeks in which to review the revisions. The student must notify the department office **at least three weeks before** the scheduled oral defense, and provide the date, time, location, and title of presentation.

It is the student's responsibility to ensure that the final document submitted to the University is prepared according to the detailed regulations and procedures outlined in the University's Graduate Bulletin. Acceptance of the dissertation will be by majority vote of the Dissertation Committee and is subject to the approval of the University.

EHS research tool requirement: **The research tool requirement must be completed by the end of the third year of study, at the latest.**

The research tool will comprise the preparation of a poster describing aspects of the student's research program. The format of the poster will follow the requirements of the School of Public Health's poster day or those of relevant scientific society meetings. The poster will be presented to the student's dissertation committee at the time of the Qualifying Examination Part II and will be

accompanied by a brief oral discussion by the student of the poster's content. The dissertation committee will grade the research tool based on the presentation of the data, the content of the poster, and the clarity of the oral presentation, as S/U.

EHT 690: LABORATORY ROTATIONS

The aims of the laboratory rotations are:

1. To allow the student to interact with scientists of varied disciplines.
2. To introduce the student to analytical, field and laboratory techniques and principles.
3. To give both the students and the faculty an opportunity to interact intellectually.
4. To aid the student in selecting a mentor for graduate research.

All students must participate in the rotations. Students may not repeat a rotation with the same mentor. Exceptions to this plan are subject to approval of the Department Chair. The student is expected to dedicate at least 12 hours per week to each rotation.

Rotation Schedule: Ph.D. and research M.S. students will take two rotations for a total of three credits. Each rotation in the semester will last 7 weeks. The grading system is S/U. An unsatisfactory grade in any rotation will result in a U for that semester. Please note that a satisfactory grade in the two rotations must be attained to fulfill the rotation requirement. A Rotations Coordinator will help match students with appropriate Faculty Research Mentors. Students in the technical Master's thesis program are not required to take rotations.

The rotation schedule is designed to obtain the maximum analytical, field, and laboratory experience within the framework of courses and additional graduate responsibilities.

Student Obligations: A student may choose to work in the laboratory (field, laboratory, or office environment, or some combination thereof) of any faculty member within the Department of Environmental Health Sciences. The student may not spend the entire rotation time exclusively in an office setting. An office-based rotation must be spent learning skills directly applicable to carrying out scientific research. Some examples of acceptable office-based rotation activities are: statistical analysis of databases, computer modeling of data, and mapping using a geographic information system (GIS). Special permission may be given to a student who wishes to do a rotation with a faculty member in one of the school's other departments.

At the end of each rotation, the students are required to write a **formal** report describing their project. This report should be given to the Coordinator for review. The Coordinator will work with the Mentor to establish and submit a grade. Note that the final version of the report should be submitted to the Department Office no more than one week after the end of a rotation. The student is responsible for submitting this report, and failure to do so will result in an "Incomplete" grade.

ENVIRONMENTAL CHEMISTRY PROGRAM

The Environmental Chemistry track emphasizes significant environmental and public health problems. The track's unique position within New York State's Department of Health provides its students and faculty with first-class, modern instrumentation and facilities as well as an abundance of research problems of fundamental and practical interest. Research specializations include analytical chemistry, atmospheric chemistry, transport and transformations of PCB's and dioxins, and nuclear chemistry. Additionally, students may choose to utilize the tools of chemistry and physics in collaborative projects with, for example, scientists in such disciplines as microbiology, toxicology, biochemistry or epidemiology. The goal of the program is to train students to become competent and productive researchers in their chosen specialty so that they may assume leadership positions in academia, government or industry.

Program Leading to the Master of Science Degree (36 graduate credits minimum)

Technical masters degree students can select from among the following subspecialties: Environmental Analytical Chemistry; Environmental Chemistry; or Biomonitoring

1. Core Courses*, 12 credits. EHT 520 Principles of Environmental Chemistry (3), EHT 540 Principles of Radiation Science or approved substitute (3), EHT 525 Environmental Chemical Analysis (3), and Epi 552 or equivalent statistics course (3).

Program Leading to the Doctor of Philosophy Degree (66 graduate credits minimum)

The program typically requires at least four academic years of full-time study and research. Students in the M.S. program must complete that degree before entering the Ph.D. program. The course of study of each student is planned with a faculty advisor who takes into account the student's previous preparation, area of specialization, and professional objectives.

1. Core Courses*, 15 credits, EHT 520 Principles of Environmental Chemistry (3), EHT 540 Principles of Radiation Science (3), EHT 525 Environmental Chemical Analysis (3), EHT 690 Laboratory Rotation in Environmental Health Sciences (3), and Epi 552 or equivalent statistics course (3).

*Core courses may be waived on the basis of prior course experience or demonstrated competence in the subject. This waiver does not reduce the total number of credits required for the degree.

TOXICOLOGY PROGRAM

Programs in the Toxicology track are designed to prepare students for technical, professional, and supervisory positions and careers in academic institutions, public agencies, and industry. The curriculum emphasizes the application of classical biological, physical and medical sciences to help solve public health problems associated with toxic chemicals. Research specializations are available in microbiology, neurotoxicology, in vitro toxicology, biochemical toxicology, molecular toxicology, chemical carcinogenesis, and immunotoxicology. The program is flexible and will reflect the individual needs of the student. Emphasis will be placed on developing the research tools to enable each student to become a productive researcher in toxicology.

Program Leading to the Master of Science Degree (36 graduate credits minimum)

Technical masters degree students can select from among the following subspecialties: Pharmaco/Toxicogenomics or Xenobiotic and Drug Metabolism.

1. Core Courses*, 13 credits. EHT 530 Principles of Toxicology (3), BMS 504a Comprehensive Biochemistry (4); BMS 504b Comprehensive Biochemistry or approved substitution (3), and Epi 552 or an equivalent statistics course (3).

Program Leading to the Doctor of Philosophy Degree (66 graduate credits minimum)

The program typically requires at least four academic years of full-time study and research. Students in the M.S. program must complete that degree before entering the Ph.D. program. The course of study of each student is planned with a faculty advisor who takes into account the student's previous preparation, area of specialization, and professional objectives.

1. Core Courses*, 16 credits. EHT 530 Principles of Toxicology (3), BMS 504a,b Comprehensive Biochemistry (4,3), EHT 690 Laboratory Rotations in Environmental Health & Toxicology (3), and Epi 552 or an equivalent statistics course (3).

*Core courses may be waived on the basis of prior course experience or demonstrated competence in the subject. This waiver does not reduce the total number of credits required for the degree.

ENVIRONMENTAL AND OCCUPATIONAL HEALTH PROGRAM

The environmental and occupational health track offers graduate education in two program areas: (1) preparation for a career in applied environmental health, (2) preparation for the practice of occupational health. The program provides a readily accessible bridge between the disciplines of biology, microbiology, chemistry, physics, and the behavioral sciences and range of problems and issues in the prevention and control of environmental-provoked disease. Emphasis is on the development and use of factual bases to define the health effects of exposure of individuals or populations to hazardous materials and situations, environmentally caused diseases, integrating the results of risk assessment with engineering, social, economic and political concerns to reach a decision.

Environmental Health

The Environmental Health program of studies is directed to the recognition and evaluation of agents in air, water, food, and shelter which may increase the risk of disease, dysfunction and premature death. It provides instruction and research opportunities in the technical and scientific disciplines that have direct or indirect impact on the prevention of human disease and the promotion of human health through control of the environment. These include technical supervision, monitoring, and development of performance standards for ensuring a safe water supply, proper disposal of liquid and solid waste; food protection and for achieving risk reduction in human habitats. The objective of this specialization is to provide instruction in the control of factors in the workplace that may cause disease, dysfunction and premature death.

Occupational Health

The Occupational Health program of studies is directed toward the recognition, evaluation and control of conditions of workplace which may increase the risk of illness or injury. The basic curriculum includes toxicology, biostatistics, epidemiology, principle of industrial hygiene and safety, measurements and controls, occupational health program management in the private and public sectors. The objective of this specialization is to provide instruction in the recognition and evaluation of factors in the workplace that may cause disease, dysfunction and premature death.

Program Leading to the Master of Science Degree (36 graduate credits minimum)

In order to meet changing demands in environmental and occupational health the curriculum has been structured to accommodate the diversity of background and future assignment of the student. The curriculum is individually planned according to the needs of the student. It is designed to contain breadth of coverage in addition to intensive work in the field of special study.

Technical masters degree students can select from among the following subspecialties: Environmental Health; Environmental Epidemiology; or Risk Assessment.

1. Core Courses*, 12 credits. Epi 501 Principles and Methods of Epidemiology I (3), EHT 590 Introduction to Environmental Health (3), EHT 530 Principle of Toxicology (3), and Epi 552 Principles of Statistical Inference I (3).

Program Leading to the Doctor of Philosophy Degree (66 graduate credits minimum)

The doctoral programs in environmental and occupational health provide an advanced education in the field with an emphasis on general practice and on research. The program requires at least four academic years of full-time study and research. Students in the M.S. program must complete that degree before entering the Ph.D. program. The course of study of each student is planned with a faculty advisor who takes into account the student's previous preparation, area of specialization, and professional objectives.

1. Core Courses*, 15 credits. Epi 501 Principles and Methods of Epidemiology I (3), EHT 590 Introduction to Environmental Health (3), EHT 530 Principle of Toxicology (3), EHT 690 Laboratory Rotations in Environmental Health Sciences (3) and Epi 552 Principles of Statistical Inference I (3).

*Core courses may be waived on the basis of prior course experience or demonstrated competence in the subject. This waiver does not reduce the total number of credits required for the degree.