

**UNIVERSITY OF MARYLAND,
UNIVERSITY COLLEGE**

UNIVERSITY OF MARYLAND UNIVERSITY COLLEGE

OFFICE OF SPECIAL PROGRAMS

BACCALAUREATE DEGREE PROGRAM IN ENVIRONMENTAL AND HAZARDOUS MATERIALS MANAGEMENT

The University of Maryland, University College is pleased to introduce its Bachelor of Science Program in Environmental and Hazardous Materials Management. This Program is offered nationally, contract based at your location, to meet your needs, and reflect our commitment to Quality, Service, Success.

THE INSTITUTION

University College is the international outreach campus of the University of Maryland System, and by far the largest. For over forty years its primary mission has been the delivery of high quality education to employed adults, when and where they need it, consistently pioneering new programs to meet the rise of new delivery challenges.

Within University College, the office of Special Programs (OSP) is the champion of change, chartered to provide educational services in response to national client needs, particularly in the face of unique delivery requirements. Its flagship offering, for example, the multi-media BS in Nuclear Science delivered on-site to nuclear power utilities, is the largest nuclear degree program in the United States. OSP also includes the National Center for Hazard Communication. Because of its charter, its experience, and its demonstrable success, the Office of Special Programs was the natural base from which to launch the baccalaureate Program in Environmental and Hazardous Materials Management.

PROGRAM DEMAND

Public sensitivity to the need for hazardous materials managers is both popular and widespread. Government regulations have increasingly sanctioned this demand. The California Environmental Business Resources Assistance Center (CEBRAC) forecasts a demand for environmental professionals increasing 25% a year. It also notes that just cleaning up spills will be a leading industry in this decade. The U.S. Department of Health and Human Services (DHHS) notes a 1992 workforce of hazardous materials managers of 50,000, with an *immediate* need for 25,000 more and additional training for 5,000 already engaged. DHHS also estimates 3.4 staff variously involved in hazardous materials easily with existing AA degrees or follow-on graduate work. It is a structured curriculum, pre-requisites leading to more advanced courses in keeping with its knowledge orientation, but also flexible enough to accommodate to the highly skilled entrant. It includes both general education and elective courses, and allows students, following their foundations in hazardous materials courses (HZMT) and environmental science courses (ENSC), to select a specialty track in hazardous chemicals, nuclear/health physics, or

environmental issues. The capstone course requires a hands-on management project completed on-site. A complete Program curriculum is attached. In addition to specific course content descriptions, it should be noted that communications, regulation, and MIS are integrated throughout.

It should be noted that while the complete 120 semester hour Program can be delivered by the Office of Special Programs, transfer credit leading to degree completion may also be accepted from:

- other two year or four year college courses as appropriate,
- standardized tests such as CLEP and DANTEs,
- approved company or military training programs
- course challenges.

For further information, please contact:

Thomas A. Janke
Assistant Vice President
Office of Special Programs
University of Maryland University College
University Boulevard at Adelphi Road
College Park, MD 20742-1663
Phone 301-985-7881, Fax 301-985-7937

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Attachment

UNIVERSITY OF MARYLAND UNIVERSITY COLLEGE

OFFICE OF SPECIAL PROGRAMS

ENVIRONMENTAL AND HAZARDOUS MATERIALS MANAGEMENT

Bachelor of Science Degree

May 1993

CURRICULUM

I.	General Education Requirements (36 sh)	Hours
	Communications	9
	Social Sciences (Include Global Context)	6
	Humanities (Include Historical Context)	6
	Mathematics and Science:	
	Biology (General)	3
	Chemistry (General, Organic/Biochem)*	8
	Calculus I	4
II.	Related to Concentration (13 sh)	
	MATH 141. Calculus II	4
	MATH 246. Differential Equations	3
	HZMT 202. Introduction to Hazardous Materials	3
	ENSC 206. Environment and Ecosystems	3
III.	Primary Concentration (24 sh/15 UL)	
	HZMT 203. Physiology and Toxicology	3
	HZMT 204. HAZMAT Skills Training	3
	HZMT 205. Emergency Preparedness and Response	3
	HZMT 301. Industrial HAZMAT Processes	3
	ENSC 302. Environmental Law & Regulation	3
	ENSC 402. Environmental Health/Occupational Safety	3
	HZMT 404. Communications for HAZMAT Managers	3
	HZMT 495. Current Issues in HAZMAT Management	3
IV.	Secondary Concentration (21-22 sh/18 UL)	
	HUMN 390. Writing for Managers	3
	TMGT 302. Management: Perspectives, Process, Productivity	6
	TMGT 444. Risk Assessment and Management	6
	In addition, each student must select:	
	HZMT 308. Health Physics	3
	HZMT 408. Nuclear Materials Management	3
	or	
	CHEM 233. Organic chemistry	4
	CHEM 374. Technology, Energy, Risk	3
	or	
	ENSC 307. Environmental Issues	3
	ENSC 407. Environmental Health/Remediation	3

V.	Electives (26-27 sh/9 UL)	
	TMGT 201. Intro to Computers (or equivalent)	3
	Others as appropriate	
VI.	Total	120

ENVIRONMENTAL AND HAZARDOUS MATERIALS MANAGEMENT

BACHELOR OF SCIENCE

Course Descriptions

- I. General Education Requirements (36 credits)
 - A. Communications (9 credits)

English 101 or equivalent, another writing course, and a course in either speech or writing.
 - B. Social Sciences (6 credits)

Credit from courses in Anthropology, Economics, Geography, Psychology, Government, Sociology and BEHS can satisfy this requirement.
 - C. Humanities (6 credits)

Credit from courses in History, Philosophy, Humanities, Literature, and the Arts can satisfy this requirement.
 - D. Mathematics and Science (14 credits)
 1. BIOL 101 Concepts of Biology (3 credits)

A study of the fundamental processes and the interdependence of living organisms, as well as the biological implications of the influence of human beings in the biological world.
 2. CHEM 103 General Chemistry 1 (4 credits)

The first semester of a chemistry sequence intended for students whose curricula require a year or more of chemistry. The nature and composition of matter, chemical calculations, elements and inorganic compounds.

Prerequisite: A satisfactory math SAT score or an adequate knowledge of high school chemistry or satisfactory performance in CHEM 001.
 3. CHEM 104 Fundamentals of Organic and Biochemistry (4 credits)

Intended for students whose curricula require one year of chemistry. The chemistry of carbon: aliphatic compounds, aromatic compound, stereochemistry, halides, amines and amides, acids, esters, carbohydrates,

and natural products. Credit will be granted for only one of the following:
CHEM 104 and CHEM 233 (or CHEM 235).

Prerequisite: CHEM 103 or CHEM 105

--OR--

CHEM 113 General Chemistry II (4 credits)

Kinetics; homogeneous, heterogeneous, and ionic equilibria; oxidation-reduction; electrochemistry; chemistry of the elements.

Prerequisite: CHEM 103 or CHEM 105

4. MATH 140 Calculus I (4 credits)

An introduction to calculus, including functions, limits, continuity, derivatives and applications of the derivative, sketching of graphs of functions, definite and indefinite integrals, and calculation of area.

Prerequisite: 3-1/2 years of college preparatory mathematics (including trigonometry) and satisfactory performance on a mathematics placement test, or MATH 115 (Precalculus).

II. Related to Concentration (13 credits)

A. MATH 141 Calculus II (4 credits)

Elementary development of propositional and predicate logic, including semantics and deductive systems. Discussion covers completeness and incompleteness, and the decision problem.

Prerequisite: MATH 140

B. MATH 246 Differential Equations (3 credits)

An introduction to the basic methods of solving differential equations. Separable, exact and especially linear differential equations are addressed. The main techniques considered are undetermined coefficients, series solution, Laplace transforms, and numerical methods.

Prerequisite: MATH 141

C. HZMT 202 Introduction to Hazardous Materials (3 credits)

Physical and chemical characteristics of nuclear, hazardous chemical, and mixed waste materials.

Prerequisite: ENSC 201 & CHEM 104 or 233

D. ENSC 206 Environment and Ecosystems (3 credits)

This course will provide an overview of the basic scientific principles governing ecosystems, particularly as they relate to the environmental consequences of industrial processes including the use, storage and disposal of hazardous materials. Subjects will be drawn widely from geology, hydrology, meteorology, and ecology.

Prerequisite: ENSC 201, CHEM 104 or 233

III. Primary Concentration (24 credits/15 UL)

A. HZMT 203 Physiology and Toxicology (3 credits)

Subjects will be drawn from chemistry, biochemistry, anatomy and physiology, describing the normal function of human body systems. Basic principles of toxicology will be used to provide an overview of human health effects associated with exposure to hazardous chemicals in the community or work environment.

Prerequisite: BIOL 101, CHEM 104 or 233

B. HZMT 204 Hazardous Materials Skills Training (3 credits)

Hands-on experience in preparing hazardous materials for transportation, working in the hazardous environment, practical exercises in emergency response, and remediation.

Prerequisite: HZMT 202

C. HZMT 205 Emergency Preparedness and Response (3 credits)

Planning and organizing for HAZMAT emergencies; direction and control of emergency response; public participation; environmental remediation.

Prerequisite: HZMT 202, (HZMT 204 Co-requisite)

D. HZMT 301 Industrial HAZMAT Processes (3 credits)

Review of HAZMAT life cycle and transfer points including acquisition and compounding, transportation, storage, utilization, and disposal in various industries. Process Safety Analysis.

Prerequisite: ENSC 302

E. ENSC 302 Environmental Law and Regulation (3 credits)

Principles of constitutional and administrative law fundamental to control of the hazardous waste cycle, cleanup of environmental contamination, and other environmental and occupational health regulations will be surveyed. Students will develop a basic knowledge of federal legislation including RCRA, CERCLA, FIFRA, TSCA, FDA, OSHA, and will become familiar with use of the Federal Register and the Code of Federal Regulations. The social contract and its

sanctions, as expressed in law and litigation at local, state, national and international levels, will be reviewed.

Prerequisite: HZMT 202, ENSC 206

F. ENSC 402 Environmental Health/Occupational Safety (3 credits)

This course will provide an introduction to the regulatory statutes and agencies governing environmental and occupational health and safety. Principles of industrial hygiene including recognition, evaluation and control of hazards, medical surveillance, and personal protective equipment will be considered. Spill and exposure prevention, contamination reduction and removal methods will be discussed.

Prerequisite: HZMT 203, HZMT 301

G. HZMT 404 Communication for Env/Hazmat Managers (3 credits)

Structure, methodology and application of the theoretical principles of communication, particularly as they pertain to a specific audience, content area or situation. Special attention will be given to communication of risk and legal information, communicating in emergencies, and public relations communication.

Prerequisite: BEHS 202, TMGT 201, ENSC 302, HUMN 390 and TMGT 444

H. HZMT 495 Current issues in Env/Hazmat Management (3 credits)

This is the capstone course for the program and consists of topical discussions of timely HAZMAT subjects and an on-site management project. To be taken in last semester of EHMM courses.

Prerequisite: TMGT 444 & CHEM 374 or HZMT 408 or ENSC 407

IV. Secondary Concentration (22 credits/18 UL)

A. HUMN 390 Writing for Managers (3 credits)

A course that focuses on the kinds of writing skills managers need for the workplace. Students will develop the following critical skills for organizational communication: writing for a specific purpose and audience; organizing information effectively; polishing the mechanics of written English; and evaluating their own writing. Students will be required to write highly sophisticated memos, letters, proposals, and reports.

Prerequisite: ENGL 101 or equivalent

B. TMGT 302 Management: Perspectives, Process, Productivity (6 credits)

A systematic exploration of management processes and organizational behavior. The course includes planning, leading, group dynamics, and motivation. Organizational, behavioral, and systems perspectives on management are

compared. Recent perspectives on productivity, quality and organizational culture are emphasized.

C. TMGT 444 Risk Assessment and Management (6 credits)

A study of risk that draws from the social sciences and management to examine the effects of risk on personal and professional life. It explores the concept as applied to assessing economic and monetary risk, physical risk, and social and ethical risk. Dimensions include calculating risk, the risks inherent in decision making, and relevant legal questions.

D.1. HZMT 308 Health Physics (3 credits)

Introduction to atomic and nuclear physics theory, biological effects of ionizing radiation, environmental aspects of radiation, radiation monitoring and radiation safety.

Prerequisite: HZMT 202, HZMT 203

D.2. HZMT 408 Nuclear Materials Management (3 credits)

Subjects related specifically to the management of mixed nuclear materials, transuranic, and spent fuels with special consideration given to transportation, storage, and waste. Concepts of environmental monitoring, remediation, and pollution prevention will be discussed.

Prerequisite: HZMT 308, TMGT 444

--OR--

E.1. CHEM 233 Organic Chemistry I (4 credits)

The chemistry of carbon: aliphatic compounds, aromatic compounds, stereochemistry, arenes, halides, alcohols, esters, and spectroscopy. Credit will be granted for only one of the following: CHEM 104, CHEM 233, CHEM 235

Prerequisite: CHEM 113 or CHEM 115

E.2. CHEM 374 Technology, Energy and Risk (3 credits)

Decision-making in a technological, democratic society. Current issues such as acid rain, nuclear power, synthetic organic chemicals.

Prerequisite: CHEM 233

--OR--

F.1. ENSC 307 Environmental Issues (3 credits)

Current issues in environmental pollution, remediation and conservation, particularly as they relate to hazardous materials will be examined in a multifaceted scientific, legal and political context. Selected topics will be drawn from ongoing national and international events concerning hazardous materials.
Prerequisite: ENSC 302

F.2. ENSC 407 Environmental Health and Remediation (3 credits)

This course provides management skills training, focusing on industry's role in the protection and recovery of environmental resources. A pragmatic, management-oriented overview of environmental legislation and problem solving techniques for the implementation of policies and procedures regarding the safe use, storage and disposal of hazardous materials will be provided.
Prerequisite: ENSC 307, HZMT 301, TMGT 444

V. Electives (26-27 credits/9 UL)

A. TMGT 201 Introduction to Computer-Based Systems (3 credits)

An overview of computer information systems. Computer hardware, software, procedures, systems, and human resources are introduced, and then ways of integrating and applying them in business and other segments of society are explored. The fundamentals of problem solving and programming by computer are discussed and demonstrated.
Prerequisite: none

B. Others as appropriate

Environmental and Hazardous Materials Management
Baccalaureate Degree

PROGRAM OBJECTIVES

Upon completion of the University of Maryland, University College baccalaureate degree in Environmental and Hazardous Materials Management the graduate will be able to:

- 1) Identify technical methods for the safe use, handling, storage, and transportation of hazardous materials through the life cycle of such materials from the point of initial extraction to final disposal.
- 2) Identify and access multiple information systems to guide the safe use, storage, and handling of hazardous materials. Such information systems include written materials, computer data bases, and Federal, State and local agency personnel.
- 3) Demonstrate a beginning knowledge of effective techniques for communicating scientific, technical and legal information to diverse populations including industry management personnel, community groups, workers, and media representatives.
- 4) Identify, and begin to interpret and apply, regulations governing hazardous materials in the workplace, and community environments.
- 5) Identify the basic scientific principles guiding current regulations and recommended practices for the safe handling of hazardous materials throughout the life cycle of such substances, including toxicology, biology, chemistry, physics, and earth sciences.
- 6) Demonstrate a basic, hands-on knowledge of the proper use of personal protective equipment, packaging materials, and environmental monitoring technologies commonly used in handling hazardous materials.
- 7) Develop comprehensive management strategies for day-to-day operations involving hazardous substances, as well as planning and preparations for exigencies.