
DEPARTMENT OF AGRICULTURE, FOOD AND RESOURCE SCIENCES

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Dr. Robert B. Dadson, Acting Chairperson

MISSION

The mission of the Department of Agriculture, Food and Resource Sciences is to provide students with an active learning environment that will prepare them to compete successfully in a global society. Graduates of our programs will be poised to make significant, positive contributions to the food and agricultural sciences, which is in keeping with the land-grant philosophy of learning, discovery, and engagement. Thus, it is our never-ending task to provide students with a nurturing environment that offers opportunities for discovery through experiential learning. Accomplishment of our task will result in graduates who have;

- skills in information management;
- critical and analytical thinking skills necessary to integrate theory and real-world situations for making management decisions;
- the ability to communicate effectively;
- the ability to compete in a highly technological, computer-information oriented, global society.

Additionally, we strive to prepare students who can interact successfully in an ethnically diverse workforce that is comprised of people of socially and culturally diverse backgrounds.

OBJECTIVES

The objectives of the Department of Agriculture, Food and Resource Sciences are as follows:

1. To provide an interdisciplinary program inclusive of mathematical, biological, physical and social sciences, and humanities to support areas of concentration in the food and agricultural sciences, including conservation and preservation of our natural resources
2. To prepare students to interpret and apply scientific principles and techniques in the ever-evolving food, agricultural, and environmental sciences, on a global basis
3. To promote civic responsibilities of students through community interactions
4. To provide students with the applied information technology skills necessary to compete successfully in today's workforce.

DEGREES OFFERED

Bachelor of Science - Agribusiness
Bachelor of Science - General Agriculture
Master of Science¹ - Food and Agricultural Sciences
Doctor of Philosophy¹ - Food Science and Technology

DEPARTMENTAL REQUIREMENTS

The admission of students to the undergraduate programs in the Department of Agriculture, Food and Resource Sciences is based upon the general admission requirements of the University. Successful completion of PRAXIS I and minimum GPA of 2.75 are required for admission to the Agriculture Education concentration offered in the General Agriculture degree program.

¹See Graduate Catalog

Agribusiness major - Students majoring in Agribusiness must complete a total of 120 credit hours of University courses. This includes a minimum of 45 semester hours of General Education Requirements, 15 semester hours of Departmental Core courses¹, 48 semester hours of Major Core courses¹, 6 semester hours of Supportive courses², and 6 semester hours of free electives.

General Agriculture major - Students majoring in General Agriculture must complete a total of 120 credit hours of University courses. This includes a minimum of 42-43 semester hours of General Education Requirements, 15 semester hours of Departmental Core courses¹, 24 - 48 semester hours of Major Core courses¹, 18-35 semester hours of Supportive courses², and 3-5 semester hours of free electives, depending on the Option Area chosen. The Option Areas include;

Agriculture Education Option: 42, 15, 45, 18 and 3 semester hours of General Education Requirements, Departmental Core Courses¹, Major Core Courses¹ Supportive Courses² and Free Elective Courses, respectively.

Agricultural Studies Option: 41, 15, 27, 37 and 0 semester hours of General Education Requirements, Departmental Core Courses¹, Major Core Courses¹, Supportive Courses² and Free Elective Courses, respectively.

Animal and Poultry Science Business/Technology Option I: 43, 15, 27, 30 and 5 semester hours of General Education Requirements, Departmental Core Courses¹, Major Core Courses¹, Supportive Courses² and Free Elective Courses, respectively.

Animal and Poultry Science Pre-Veterinary/Pre-Professional Option II: 43, 15, 24, 35 and 3 semester hours of General Education Requirements, Departmental Core Courses¹, Major Core Courses¹, Supportive Courses² and Free Elective Courses, respectively.

Plant and Soil Science Option: 43, 15, 24, 35 and 3 semester hours of General Education Requirements, Departmental Core Courses¹, Major Core Courses¹, Supportive Courses² and Free Elective Courses, respectively.

AGRIBUSINESS

COMMON REQUIRED COURSES

Agribusiness Major¹ – Students majoring in Agribusiness must complete a minimum of 120 semester hours of University courses. Included in the 120 semester hours are 15 credits of program core requirements comprising; AGECE 213, AGME 283, AGRI 301, ANPT 114 , PLSC 184, and PLSC 185.

CAREER OPPORTUNITIES

A degree in Agribusiness prepares students to teach, to conduct research, to pursue graduate and professional degrees, to work in government and business, and numerous other related jobs such as: Business and Technology, Marketing and Management, International Trade and Development, Economic Research, Commodity Brokerage, Computer Science, Public Relations Specialist, Market Forecaster, Technical Representative, Extension Educator, Market Reporter, Financial Analyst, and Financial Representative.

REQUIRED MAJOR COURSES²

AGBU 223	AGEC 333	ECON 200/H	ACCT 202
AGBU 313	AGEC 423	ECON 300	ACCT 202
AGBU 323	AGEC 433		CSDP 220
AGBI 471	AGEC 443		MATH 112
	AGEC 453		

¹Students must receive a grade of “C” or better in each course in this area.

²A minimum grade of “C” or better must be achieved in these courses.

CURRICULUM GUIDE FOR AGRIBUSINESS

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	GEN ED CURR AREA IV	3
ENGL 101/H	3	AGME 283	3
MATH 109	3	ECON 202/H	3
ECON 201/H	3	MATH 112	4
AGNR 111	<u>1</u>	ENGL 102/H	3
	14	ENGL 001	<u>0</u>
			16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
GEN ED CURR AREA I	3	GEN ED CURR AREA I	3
ENGL 203	3	AGBU 223	3
GEN ED CURR AREA II	3	GEN ED CURR AREA III	4
PLSC 184	3	CSDP 220	<u>4</u>
PLSC 185	1		14
AGEC 213	<u>3</u>		
	16		

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGBU 313	3	ACCT 202	3
ACCT 201	3	GEN ED CURR AREA IV	3
GEN ED CURR AREA III	4	ENGL 305/Online	3
AGBU 323	3	Elective ²	3
ECON 300	<u>3</u>	AGEC 333	3
	16	AGRI 301	<u>1</u>
			16

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGEC 433	3	AGEC 423	3
AGEC 463	3	AGEC 443	3
AGEC 453	3	Supportive Course ¹	3
Supportive Course ¹	3	Elective ²	<u>3</u>
Elective ²	<u>3</u>		12
	15		

Total Credit Hours: 120

¹Students must select a minimum of six (6) credit hours from these supportive courses: ACCT 301, AGBU 300, AGBU 371, AGBU 400, AGECE 419, BUAD 302, BUAD 307, BUAD 411, BUAD 412, CSDP 240, ECON 301, ECON 302, ECON 303, ECON 304 or ECON 402.

²Students may take any course offered at the University for which they meet the prerequisites.

GENERAL AGRICULTURE

COMMON REQUIRED COURSES FOR ALL CONCENTRATIONS

All General Agriculture¹ majors in the Department of Agriculture, Food and Resource Sciences with concentrations in Agriculture Education, Agricultural Studies, Animal and Poultry Science Option I (Business/Technology), Animal and Poultry Science Option II (Pre-Veterinary/Pre-Professional), and Plant and Soil Science must complete a total of 15 semester hours of Departmental Core Courses which include: AGEC 213, AGME 283, AGRI 301, ANPT 114, PLSC 184, and PLSC 185.

CAREER OPPORTUNITIES

A degree in General Agriculture prepares students to teach, to conduct research, to pursue graduate and professional degrees, to work in government and business, and numerous other related careers or jobs such as: Agricultural Education, Veterinary Medicine, Animal Management and Production, Livestock Production Management, Animal Health Product Sales, Feed Sales/Management, Livestock Equipment Sales/Mgt, Livestock Procurement, A.I. Breeding Technician, Livestock Feedlot Operations, Market Forecasting, Food Safety, Plant Breeding and Biotechnology, Greenhouse & Nursery Management, Landscape Design, Water Quality, Nutrient Management, Food and Fiber Processing, Natural Resource Sciences, Extension Education, Housing & Environmental Quality, Livestock Insurance, Quality Assurance, Farm Management, Stable Management, Market Reporting, Meat Grading, geospatial information technologies, soil chemists, soil biologists, plant biochemists, plant pathologists, entomologists, horticulturists, agronomists, soil hydrologists, and soil microbiologists.

REQUIRED MAJOR COURSES

AGRICULTURE EDUCATION (Grades 7-12)²

EDCI 200	PSYC 303
EDCI 201 ³	PSYC 307
EDCI 311	
EDCI 400	
EDCI 406	
EDCI 409	
EDCI 410	
EDCI 427	
EDCI 480	
EDCI 490	

¹A minimum grade of "C" or better must be earned in each of these courses.

²For additional program requirements for the Agriculture Education (Teaching) major, please refer to the Department of Education and the Teacher Education Handbook. UMES' Teacher Education Programs are accredited by the National Council for Accreditation of Teacher Education and approved by the Maryland State Department of Education.

³Does not count toward graduation.

**CURRICULUM GUIDE FOR GENERAL AGRICULTURE
AGRICULTURE EDUCATION (Grades 7-12)^{1 & 2}**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	Elective Agricultural course ³	3
ENGL 101	3	AGME 283	3
MATH 109	3	GEN ED CURR AREA I	3
BIOL 111	3	ECON 202/H	3
BIOL 113	1	ENGL 102	3
AGNR 111	<u>1</u>	ENGL 001	<u>0</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
PSYC 200	3	GEN ED CURR AREA I	3
ENGL 203	3	ENGL 305 or ENGL 310	3
CHEM 111	3	PSYC 303	3
CHEM 113	1	PSYC 307	3
EDCI 200	3	Elective Agricultural Course ³	<u>3</u>
EDCI 201 ⁴	1		15
AGEC 213	<u>3</u>		
	17		

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	EDCI 406	3
PLSC 184	3	EDCI 409	3
PLSC 185	1	AGRI 301	1
AGED 313	3	Elective Agricultural course ³	3
Elective Agricultural course ³	3	Elective Agricultural course ³	<u>3</u>
Elective Agricultural course ³	<u>3</u>		13
	16		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
EDCI 311	3	EDCI 400	3
EDCI 427	3	EDCI 480	6
EDCI 410	3	EDCI 490	<u>6</u>
EDSP 428	3		15
Elective Agricultural course ³	<u>3</u>		
	15		

Total Credit Hours: 120

¹A minimum grade of "C" or better must be earned in each of these courses.

²A grade of "C" or better will be required in the courses taken to satisfy the Agriculture Education Concentration requirement.

³200-300 level agricultural courses.

⁴Does not count toward graduation.

**GENERAL AGRICULTURE
AGRICULTURAL STUDIES**

All General Agriculture¹ majors in the Department of Agriculture, Food and Resource Sciences with concentrations in Agricultural Studies must complete a total of 15 semester hours of Departmental Core Courses which include: AGEC 213, AGME 283, AGRI 301, ANPT 114, PLSC 184, and PLSC 185.

REQUIRED MAJOR COURSES¹

Students must select a minimum of 27 credit hours of which one three credit-hour course must be selected from at least three current Department Programs.

¹A minimum grade of “C” or better must be earned in each of these courses.

**CURRICULUM GUIDE FOR GENERAL AGRICULTURE
AGRICULTURAL STUDIES**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	GEN ED CURR AREA VI ¹	3
ENGL 101/H	3	ENGL 102/H	3
MATH 109	3	ENGL 001	0
PLSC 184	3	GEN ED CURR AREA VI ¹	3
PLSC 185	1	GEN ED CURR AREA III ²	3
AGNR 111	<u>1</u>	GEN ED CURR AREA III ²	1
	15	ECON 202/H	<u>3</u>
			16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGME 283	3	GEN ED CURR AREA II ³	3
ENGL 203	3	Agricultural Studies Core Course ⁴	3
AGEC 213	3	Agricultural Studies Core Course ⁴	3
Agricultural Studies Core ⁴	3	GER REQ CURR AREA I ⁵	3
GEN ED CURR. AREA III	<u>3</u>	200-400 Level Supportive Course ⁶	<u>3</u>
	15		15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 305/Online or		AGRI 301	1
ENGL 310/Online	3	Agricultural Studies Core Course ⁴	6
Agricultural Studies Core Course ⁴	3	200-400 Level Supportive Course	3
Supportive Area Course	4	Supportive Course	2
200-400 Level Supportive Course ⁶	2	GEN ED CURR. AREA I ⁵	<u>3</u>
200-400 Level Supportive Course ⁶	<u>2</u>		15
	14		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
Agricultural Studies Core Course ⁴	3	Agricultural Studies Core Course ⁴	3
200-400 Level Supportive Course ⁶	3	Agricultural Studies Core Course ⁴	3
200-400 Level Supportive Course ⁶	3	Supportive Course	3
200-400 Level Supportive Course ⁶	3	Supportive Course	3
Supportive Course	<u>3</u>	200-400 Level Supportive Course	<u>3</u>
	15		15

Total Credit Hours: 120

¹Student must select an **Elective** from GEN ED CURR AREA VI.

²Student must select a lecture and laboratory to satisfy the GEN ED CURR AREA III requirement.

³Student must select an **Elective** from GEN CURR AREA II: Behavior Science.

⁴Students must select 27 credit hours of which one 3credit hour course must be selected from at least three current Department Programs.

⁵Student must select an **Elective** from GEN CURR AREA I.

⁶A minimum of 20 credit hours must be selected from the 200-400 level.

Student must select 37 credit hours to enhance and strengthen the students' chosen Food & Agricultural Science interest area.

GENERAL AGRICULTURE

ANIMAL AND POULTRY SCIENCE BUSINESS TECHNOLOGY OPTION¹

All General Agriculture¹ majors in the Department of Agriculture, Food and Resource Sciences with concentrations in, Animal and Poultry Science Option I (Business/Technology), Animal and Poultry Science Option II must complete a total of 15 semester hours of Departmental Core Courses which include: AGECE 213, AGME 283, AGRI 301, ANPT 114, PLSC 184, and PLSC 185.

REQUIRED MAJOR COURSES

ANPT 214	ANPT 304	ANPT 223
	ANPT 304	ANPT 313
	ANPT 424	ANPT ²

¹A minimum grade of “C” is required for each course.

²Student must select three (3) 400 level ANPT production courses

**GENERAL AGRICULTURE
ANIMAL AND POULTRY SCIENCE BUSINESS AND TECHNOLOGY OPTION I**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	GEN ED CURR AREA VI ²	3
ENGL 101/H	3	ECON 202/H	3
BIOL 111	3	BUAD 132	3
BIOL 113	1	MATH 110 or Higher	3
AGNR 111	1	ENGL 102	3
GEN ED CURR AREA I	<u>3</u>	ENGL 001	<u>0</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 223	3	AGME 283	3
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
PLSC 184	3	BIOL 222	3
PLSC 185	1	BIOL 223	1
GEN ED CURR AREA I	<u>3</u>	ANPT 214	<u>4</u>
	14		15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGEC 213	3	ACCT 202	3
ACCT 201 ³	3	ANPT 304	4
CHEM 331 or		AGRI 301	1
CHEM 211 and CHEM 213	4	BIOL 301 and BIOL 303 or	
ANPT 313	3	AMIC 324	4
ENGL 203	<u>3</u>	ANPT 400 Level Elective	<u>3</u>
	16		15

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	ENGL 305	3
ANPT 400 Level Elective	3	ANPT 424	4
GEN ED CURR. AREA II ⁴	3	ANPT 400 Level Elective	3
Free Elective ⁵	5	300-400 level course ⁶	<u>3</u>
300-400 level course ⁶	<u>3</u>		13
	17		

Total Credit Hours: 120

¹A minimum grade of "C" is required for Required Major courses.

²Student must select an **Elective** from GEN ED CURR AREA VI.

³ Supportive Course Requirements: ACCT 201, ACCT 202, BIOL 222, BIOL 223, BIOL 301, BIOL 303, AMIC 324, BUAD 132, BUED 212, CHEM 211, and CHEM 213.

⁴Student must select from GEN ED CURR AREA II: Behavioral Science.

⁵Students may take courses offered at the University for which they meet the prerequisite.

⁶Select 300-400 level courses from BUAD, ACCT, ECON, AGBU, or AGECE.

**GENERAL AGRICULTURE
ANIMAL AND POULTRY SCIENCE PRE-VETERINARY/PRE-PROFESSIONAL OPTION II¹**

All General Agriculture¹ majors in the Department of Agriculture, Food and Resource Sciences with concentrations in Animal and Poultry Science Option I (Business/Technology), Animal and Poultry Science Option II (Pre-Veterinary/Pre-Professional), must complete a total of 15 semester hours of Departmental Core Courses which include: AGEC 213, AGME 283, AGRI 301, ANPT 114, PLSC 184, and PLSC 185.

REQUIRED MAJOR COURSES

ANPT 214	ANPT 304	ANPT 424
ANPT 223	ANPT 313	ANPT ²

¹A minimum grade of "C" is required for each course.

² Student must select two (2) 400 level ANPT Production courses.

**GENERAL AGRICULTURE
ANIMAL AND POULTRY SCIENCE PRE-VETERINARY/PRE-PROFESSIONAL OPTION II¹**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	GEN ED CURR AREA VI ²	3
ENGL 101	3	ENGL 102/H	3
BIOL 111	3	ENGL 001	0
BIOL 113	1	MATH 110 or Higher	3
AGNR 111	1	CHEM 112	3
CHEM 111	3	CHEM 114	1
CHEM 114	<u>1</u>	ECON 202/H	<u>3</u>
	16		16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 203	3	ANPT 214	4
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
PLSC 184	3	BIOL 222 ³	3
PLSC 185	1	BIOL 223	1
AGEC 213	3	AGME 283	<u>3</u>
ANPT 223	<u>3</u>		15
	17		

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
PHYS 121	3	PHYS 122	3
PHYS 123	1	PHYS 124	1
ANPT 313	3	ANPT 304	4
GEN ED CURR. AREA I	3	AGRI 301	1
GEN ED CURR. AREA II ⁴	3	BIOL 301 and BIOL 303 or	
MATH 210, MATH 260 or		AMIC 324	<u>4</u>
AGNR Equivalent	<u>3</u>		13
	16		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 305 or		ANPT 424	4
ENGL 310	3	ANPT 400 Level Elective	3
CHEM 341	3	Free Elective ⁵	3
CHEM 343	1	Supportive Course ⁶	<u>4</u>
ANPT 400 Level Elective	3		14
GEN ED CURR AREA I	<u>3</u>		
	13		

Total Credit Hours: 120

¹A minimum grade of "C" is required for all Required Major Courses.

²Student must select an **Elective** from GEN ED CURR AREA VI.

³Supportive course requirements: BIOL 222, BIOL 223, CHEM 211, CHEM 213, CHEM 212, CHEM 214, CHEM 341, CHEM 343, PHYS 121, PHYS 123, PHYS 122 or PHYS 124.

⁴Student must select GEN ED CURR AREA II: Behavioral Sciences

⁵Students may take any course offered at the University for which they meet the prerequisites

⁶Student must select **one** (1) course from the following: BIOL 311, BIOL 322, BIOL 326/327, BIOL 420/421, **or** BIOL 426M

**GENERAL AGRICULTURE
PLANT AND SOIL SCIENCE¹**

All General Agriculture¹ majors in the Department of Agriculture, Food and Resource Sciences with concentrations in Plant and Soil Science must complete a total of 15 semester hours of Departmental Core Courses which include: AGEC 213, AGME 283, AGRI 301, ANPT 114, PLSC 184, and PLSC 185.

REQUIRED MAJOR COURSES¹

AGRN 423	BIOL 112/H	CHEM 211/H	SOIL 203
AMIC 324	BIOL 114/H	CHEM 213/H	SOIL 204
HORT 203/H	BUED 212		

¹A minimum grade of "C" is required for each course.

**CURRICULUM GUIDE FOR GENERAL AGRICULTURE
PLANT AND SOIL SCIENCE & 2**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGNR 111	1	GEN ED CURR AREA VI ³	3
ENGL 101/H	3	ECON 201/H	3
MATH 109 or Higher	3	BIOL 112	3
CHEM 111/H	3	BIOL 114	1
CHEM 113/H	1	CHEM 112	3
PLSC 184	3	CHEM 114	1
PLSC 185	<u>1</u>	ENGL 102/H	3
	15	ENGL 001	<u>0</u>
			17

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114/H	4	SOIL 203	3
AGEC 213/H	3	AGME 283	3
HORT 203	3	BIOL 111/H	3
ENGL 203	3	BIOL 113/H	1
CHEM 211/H	3	BUED 212	3
CHEM 213/H	<u>1</u>	GEN ED CURR AREA I	3
	17	SOIL 204	<u>1</u>
			17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 305/Online	3	AMIC 324	4
GEN ED CURR AREA I	6	AGRI 301	1
Supportive Course ⁴	3	Supportive Course ⁴	3
Supportive Course ⁵	<u>3</u>	Supportive Course ⁵	3
	15	GEN ED CURR AREA II ⁷	<u>3</u>
			14

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGRN 423/H	3	Plant and Soil Science Electives	7
Supportive Course ⁶	3	Plant and Soil Science Electives	3
Supportive Course ⁵	<u>7</u>	Free Elective ⁸	<u>3</u>
	13		13

Total Credit Hours: 120

¹Student must select a minimum of 24 credit hours from AGRI 483, AGRI 499, AGRN 333, AGNR 353, AGNR 283, AGRN 413, AGRN 499, AGNR 483, AGRN 463, ENTO 313, FDST 493, HORT 313, HORT 333, HORT 353, HORT 383, HORT 463, HORT 423, HORT NRS 404, PLSC 283, PLSC 474, PLSC 440, PLSC 484, SOIL 443, and AGME.

²Student must select a minimum of 1 credit hour from BIOL 222, BIOL 223, BIOL 402, CHEM 212, CHEM 214, CHEM 311, CHEM 312, CHEM 341, CHEM 343 or BUAD, BUED, ENVS, HUEC, MATH, PHYS with advisor's approval.

³Student must select an **Elective** from GEN ED CURR AREA VI.

⁴Student must select in the areas of Science or Math.

⁵Student must select an Elective, PLSC, Math or Science.

⁶Student must select a course in the Science area.

⁷Student must select from GEN ED CURR AREA II: Behavioral Science.

⁸Student may take any course offered at the University for which they meet the prerequisite

MINOR PROGRAMS

Students desiring a Minor in **Agribusiness**¹ must complete a minimum of 18 hours from the courses listed:

AGBU 313	AGEC 213	AGEC 333	AGEC 419
AGBU 323			AGEC 423
AGBU 371			AGEC 433
			AGEC 443
			AGEC 453
			AGEC 463

The Minor in **General Agriculture**¹ – A minor in General Agriculture requires a minimum of 18 hours for the Plant and Soil Sciences, or for the Animal and Poultry Sciences.

¹A grade of “C” or better will be required in the courses taken to satisfy the minor requirement.

COURSE DESCRIPTIONS FOR AGRIBUSINESS¹

AGBU 223 Introduction to Agribusiness/Honors Credit 3
The course offers definition and scope of agribusiness firms and explains the characteristics of agribusiness firms. It also examines trends of their expansion/decline and explores career opportunities available in agribusiness. Prerequisite: AGECE 213.

AGBU 300 Internship I Credit 3
This course offers the opportunity to students to observe and participate in management operation at university-approved agribusiness firms. A written appraisal of theoretical and/or applied management, economics, or business concepts observed during the internship is required. Prerequisite: Junior standing in Agribusiness.

AGBU 313 Quantitative Methods in Agribusiness/Honors Credit 3
Agribusiness problems will be addressed through the use of indices, graphics, budgeting, discounting, simulation, basic statistical measure, and micro-computers. Prerequisites: AGECE 213 and MATH 210.

AGBU 323 Agribusiness Management/Honors Credit 3
The course offers an examination and study of the organization, management, and operation of agribusiness firms with reference to the application of management principles for effective decision making. Prerequisite: AGBU 223.

AGBU 371 Seminar I Credit 1
A term paper with focus on economic, business or management analysis of current issues in agribusiness is required. Prerequisite: Junior standing in Agribusiness or Business.

AGBU 400 Internship II Credit 3
The course offers the opportunity for students to observe and participate in management operation at University-approved agribusiness firms. A written appraisal of theoretical and/or applied management, economics or business concepts observed during the internship is required. Prerequisite: Senior standing in Agribusiness.

AGBU 471 Seminar II Credit 1
A term paper with focus on economic, business or management analysis of current issues in agribusiness is required. Prerequisite: Senior standing in Agribusiness.

AGRICULTURAL ECONOMICS¹

AGECE 213 Introduction to Agricultural Economics/Honors Credit 3
Students will learn economic concepts, definition and scope of agricultural economics, business organizations in the food and fiber system, factors of production and their characteristics, market equilibrium analysis, and the role of price elasticities of demand and supply.

AGECE 333 Agricultural Price Analysis/Honors Credit 3
The course combines economic theory, statistics, and data to describe, understand, and forecast agricultural price relationships and variation in agriculture. Specifically, it covers quantitative techniques developed to determine the factors causing price variation and to measure trend, cyclical, seasonal, and random price variation. Prerequisite: AGECE 213.

AGECE 419 Agricultural Cooperatives Credit 3
The course reviews basic philosophy, the fundamental principles, objectives, structure, and management of cooperative organizations. It also explains and evaluates the place of cooperatives in the modern economic history and legislations that affect them. Prerequisite: AGECE 213.

AGECE 423 Marketing Agricultural Products/Honors Credit 3
The course examines the characteristics of the demand for and supply of farm products; alternative marketing channels, services, and costs involved in marketing are explained. The characteristics of cooperatives, what they have tried to do, and what they have done, as well as their special problems in organization, finance and control of their business are also examined. Prerequisite: AGECE 213.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

AGEC 433¹ International Agricultural Markets, Trade and Development/Honors Credit 3
The course focuses on international trade of agricultural products, including theory trade and monetary flows, national trade policies and world market structures for agricultural products. Impacts of trade on the domestic agricultural sector and the role of trade in agribusiness are also covered. Prerequisite: AGECE 213.

AGEC 443 Farm Management/Honors Credit 3
Farm management explores farming as a business, including factors affecting profits, size of the business, choice of enterprises, forms of tenure and leases, planning and management of specific farms, and principles and techniques of keeping and interpreting farm records and accounts. Prerequisite: AGECE 213.

AGEC 453 Agricultural Finance/Honors Credit 3
The course explains agricultural finance in agricultural firms and financial institutions, emphasizing financial reports and analysis, liquidity and risk, use of credit, and other financial alternatives to acquire control of farm resources. The sources of credit and acquisition of capital and decision-making are also explained. Prerequisites: AGECE 213 and ACCT 201.

AGEC 463 Agricultural Policy/Honors Credit 3
The course explains current policy issues, policy instruments, and choices in U.S. agriculture. Also, it describes the economic characteristics and problems of agriculture, evolution and significance of agricultural policies, the international dimension, and domestic policies that affect agriculture. Prerequisites: AGECE 213 and senior standing.

AGRICULTURE EDUCATION

AGED 313 Supervised Experience Programs Credit 3
This course is an overview of the job of the agri-science teacher and an examination of agricultural education programs for youth, with special emphasis on supervised experience practicums. Two hours lecture and two hours lab per week.

AGRICULTURAL MECHANIZATION

AGME 283 Engineering Principles Applied to Agriculture Credit 3
The application of engineering principles to problems in soil and water conservation, agricultural power units, machinery, agricultural electricity, structures, and animal environments will be studied. Material handling and processing of agricultural products will also be covered. Two hours lecture and two hours lab per week.

AGME 313 Agricultural Surveying Technology Credit 4
In this course engineering principles and theory of surveying, care and use of surveying equipment, measurement of horizontal distances and angles, differential and profile leveling, topographic surveying, mapping, field notes and area measurement computation methods are examined. Two hours lecture and four hours lab per week.

AGME 334 Small Power Equipment Technology Credit 4
This course examines engineering design and principles of operation, adjustment, maintenance and repair of light horsepower, single cylinder internal combustion engines, with special emphasis on the use of operator's service and repair manuals to determine specifications. Two hours lecture and four hours lab per week.

AGME 344 Agricultural Construction Materials and Procedures Credit 3
In this course, the selection and use of agricultural building materials, including concrete and masonry, lumber, plywood, finishes, and fasteners and proper safety and use of hand and power tools in agricultural construction will be covered. Two hours lecture and two hours lab per week.

AGME 354 Metal Construction and Maintenance Credit 4
This course covers the selection and application of ferrous and non-ferrous metals through autogenous welding, cold working and hot working processes in agricultural construction and maintenance. Two hours lecture and four hours lab per week.

AGME 374 Farm Tractor Power Credit 4
Principles of operation and service and maintenance of spark and compression ignition engines and auxiliary systems including hydraulics, power trains, electrical, and comfort control are covered in this course. Two hours lecture and four hours lab per week.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

AGME 384 Agricultural Electrification Credit 4
The course covers principles of electrical distribution and wiring according to governing codes of single and 3-phase service, and the selection of electrical controls and motors for agricultural application. Two hours lecture and four hours lab per week.

AGME 444 Agricultural Machinery and Power Management Credit 4
In this course, selection, sizing and operational principles required in the use of agricultural field and farmstead machine systems, cost analysis, and computer techniques are applied to planning and management of agricultural machinery systems. Two hours lecture and four hours lab per week.

AGME 454 Principles of Animal Environment and Structures Credit 4
Effects of environment on animal production principles of environment control; feed handling systems; waste management alternatives; and planning functional, economical, and environmentally controlled livestock facilities will be explored. Two hours lecture and four hours lab per week.

AGME 490 Pre-Occupational Internship Credit 4
Students will spend a period of up to 12 weeks with an approved agricultural business firm in their technical specialty, working as directed in management related tasks. Prerequisites: 54 credit hours and permission of instructor.

AGME 499 Special Topics Credit 1-4
This course requires a written report and an oral presentation of agricultural mechanization related topics. Prerequisite: Permission of instructor.

AGRICULTURE AND NATURAL RESOURCES

AGNR 111 First Year Experience Seminar Credit 1
This course helps to prepare students for career opportunities, as well as assisting with professional development. It focuses on adjustments needed to succeed in college, study skills and test taking, crisis or stress management, and on understanding the significance of the land-grant system. This course is designed to acquaint students with current trends, pertinent issues, and modern practices associated with the various disciplines in agriculture and natural resources from a global perspective. **Required of all first year students in the Department of Agriculture, this course substitutes for the University-wide 100 level course: First Year Experience Seminar.**

AGNR 353 Natural Resources Conservation Credit 3
Students enrolled in this course are provided the principles of soil, water, sediment, and nutrient conservation and management. Application of the principles of land use, run-off and erosion control, and soil management practices including elements of the universal soil loss equation, are also discussed. Prerequisite: PLSC 184 and PLSC 185 or permission of instructor.

AGNR 483 Principles of Geographic Information Systems Credit 3
This course is designed to provide students with an overview of the applicability and use of Geographic Information Systems (GIS); students will become competent with ArcView[®], a GIS software package from Environmental Systems Research Institute (ESRI), Inc. Students will also learn the basics of data management, data accuracy, spatial analysis, and data presentation. Prerequisite: Sophomore standing. Two hours lecture and two hours lab per week.

AGRICULTURE¹

AGRI 301 Agriculture Seminar: Professional Development Credit 1
This course is an individualized preparation for entry into a professional career in agriculture. The course is to be taken during the spring semester of the junior year. Skills such as resume writing, interviewing for employment, and developing a professional image will be emphasized. The organization of information and the presentation of technical data through oral and written communication skills will be stressed. Prerequisite: ENGL 203 or permission of instructor.

AGRI 483 Recombinant DNA Technology Credit 3
This is a laboratory course to introduce the basic principles of gene cloning. It gives essential background on working with E. coli, utilizes different cloning systems, and employs methods for PCR applications, methods and procedures for DNA sequencing. Prerequisites: Senior standing and permission of instructor.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

AGRI 499 **Special Topics in Agriculture** **Credit 3**
Students conduct research with faculty on prearranged topics. Prerequisite: Permission of instructor.

AGRONOMY¹

AGRN 333 **Weed Science** **Credit 3**
Weed identification, and action of herbicides, physical, biological, chemical and cultural weed control are covered. Safe use, handling and management of pesticides, including preparation for Maryland Certification, will also be emphasized. Two hours lecture and two hours lab per week.

AGRN 413 **Global Agronomic Crops/Honors** **Credit 3**
This course is an in-depth study of major field (cereal, oil and fiber) crops that are grown in temperate, tropical, and sub-tropical environments. Three hours lecture per week.

AGRN 423 **Plant Nutrition and Soil Fertility/Honors** **Credit 3**
This course provides an advanced study of the interrelationships between soil type, mineralogy, pH, soil nutrients, and other nutritional aspects related to plant growth, development and production. The availability and supply of micro and macro nutrients in soil, as affected by the environment, and the use of organic and inorganic fertilizers on plant growth and nutrition will be a major focus. Prerequisites: PLSC 184, PLSC 185 and SOIL 203 or permission of instructor. This course is cross-listed with AGRN 653.

AGRN 463 **Plant Genetics and Breeding** **Credit 3**
This course deals with principles of plant genetics, cytological and genetic variation in crop plants, production and control of such variation in developing varieties and hybrids, crop improvement using biotechnology, methods of breeding self- and cross pollinated crops, and production and maintenance of high quality seeds. Prerequisite: PLSC 184 or permission of instructor. Three hours lecture per week.

AGRN 499 **Independent Study in Plant and Soil Science** **Credit 1-4**
This course is designed for students with an interest in pursuing independent research topics in the plant and soil sciences. Prerequisite: Permission of instructor.

APPLIED MICROBIOLOGY

AMIC 324 **Agricultural Microbiology** **Credit 4**
Instruction includes lectures and laboratories which apply general principles of microbial ecology, food microbiology, pathogenic microbiology and industrial microbiology as they directly relate to practical applications in the Agricultural Sciences. Prerequisites: BIOL 111, CHEM 111 or permission of instructor. Three hours lecture and three hours lab per week.

ANIMAL AND POULTRY TECHNOLOGY

ANPT 114 **Introduction to Animal Science/Honors** **Credit 4**
This course is an introduction to the interspecies survey of principles through scientific animal production including breeding and genetics, reproduction, nutrition, animal management, and the importance of animal products to consumers. Three hours lecture and three hour lab per week.

ANPT 202 **Practicum in Animal and Poultry Science** **Credit 2**
In this course, students may gain practical management experience by working at the UMES animal facilities through a non-paid contractual agreement. Students may spend time in the aquaculture, swine, poultry and/or ruminant facilities. Prerequisites: Second semester freshman standing and permission of instructor. Course may be repeated, but credit toward graduation will be limited to two credit hours. Two hours lab per week.

ANPT 213 **Introduction to Aquaculture** **Credit 3**
The course covers an overview of the commercial aquaculture industry including shell and fin fish culture. Basic concepts include water quality management, reproduction, hatchery management, nutrition, disease control, processing, and marketing. Two hours lecture and three hours lab per week.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

- ANPT 214¹ Animal and Avian Physiology/Honors Credit 4**
 This course involves laboratory and lecture studies of the basic anatomy of mammals and domestic fowl and how this anatomy relates to the physiological functions of tissues, organs and systems. Prerequisite: ANPT 114 or permission of instructor. Three hours lecture and three hours lab per week.
- ANPT 223 Introduction to Poultry Technology and Management Credit 3**
 The course provides an overview of the poultry industry and how it relates to the human food chain. The basic concepts of poultry breeding, housing, management and production, processing, and marketing will be introduced. Two hours lecture and three hours lab per week.
- ANPT 304 Reproductive Physiology /Honors Credit 4**
 In this course, students study the fundamental concepts of reproduction, including, comparative physiology, reproductive technologies, and management of domestic animal reproductive performance. Prerequisites: ANPT 114 or permission of instructor. Three hours lecture and two hours lab per week.
- ANPT 313 Introduction to Animal and Avian Nutrition/Honors Credit 3**
 The fundamental concepts of digestion and metabolism of nutrients by animal and avian species are covered. Nutritional deficiencies and their requirements for various physiological functions are also included. Prerequisites: ANPT 114, CHEM 111, CHEM 113 or permission of instructor. Three hours lecture per week.
- ANPT 399 Internship in the Animal and Poultry Industry Credit 3**
 Offered as part of the student's educational training, this course provides practical work experience and familiarizes the student with the operation and management of a commercial animal or poultry business firm. Faculty will aid students in identifying firms; however, placement is not guaranteed. Prerequisite: Permission of instructor. Three hours lab per week.
- ANPT 403 Advanced Aquaculture Credit 3**
 This course covers the fundamentals of commercial fish and other marine animal production, including basic principles of pond and tank production, management, nutrition and disease control. Two hours lecture and three hours lab per week. Course also offered as NRES 403.
- ANPT 413 Advanced Poultry Production and Management Credit 3**
 The principles and current practices in hatching egg production, incubation and hatchery management and commercial broiler production are covered in this course. Topics include broiler breeder management, hatching egg incubation, broiler housing systems, ventilation, heating, lighting, feeding, and health care. Practical experience in poultry production practices will be gained by putting classroom instruction into practice through operating the 10,000 bird broiler house on the UMES farm. Prerequisites: ANPT 223 and ANPT 313, or permission of instructor. Two hours lecture and two hours lab per week.
- ANPT 423 Wildlife Management Credit 3**
 In this course, students develop an understanding of the principles and practices associated with wildlife management. Emphasis is placed on research design, sampling techniques, and field research. Students practice field techniques, analyze results, and develop management recommendations as part of semester projects. Two hours lecture and three hours lab per week. Course also offered as BIOL 463.
- ANPT 424 Animal and Avian Health and Diseases/Honors Credit 4**
 Students study parasitic, viral, bacterial and protozoan diseases of mammalian and avian species. Methods of disease prevention, control and eradication are also discussed. Prerequisites: ANPT 214/H or permission of instructor. Three hours lecture and three hours lab per week.
- ANPT 433 Livestock Production Credit 3**
 Ruminant animal production including breeding and selection, reproduction, nutrition, management production systems, herd health, ruminant wildlife and related technologies will be discussed. Two hours lecture and two hours lab per week.
- ANPT 443 Horse Production Credit 3**
 Principles and applied practices of horse production, with emphasis on management, nutrition, health care, genetics and physiology are emphasized in this course. Prerequisites: ANPT 114 or permission of instructor (offered in odd-numbered years). Two hours lecture and three hours lab per week.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

ANPT 463 Dairy Production Credit 3
Applied dairy science with emphasis on genetics, nutrition and feeding, lactation, physiology and management, and marketing systems for dairy products are topics covered in this course. Prerequisites: ANPT 114 or permission of instructor (offered even-numbered years). Two hours lecture and three hours lab per week.

ANPT 473 Swine Production Credit 3
Modern, applied aspects of swine production are covered, including breeding and selection, reproduction and artificial insemination, nutrition and feeding, environmental aspects of housing and management, production systems, herd health, and pork products and their value in the human diet. Prerequisites: ANPT 114 or permission of instructor. Two hours lecture and three hours lab per week.

ANPT 499 Special Topics in Animal and Poultry Science Credit 1-5
This course includes individualized research and study of a problem in the student's area of interest done in cooperation with an ANPT faculty member. Prerequisite: Permission of instructor.

ECONOMICS¹

ECON 201 Principles of Economics /Honors Credit 3
Students learn the principles of economic analysis, economic institutions, and issues of public policy. The emphasis is on aggregate economics, covering national income analysis, money and banking, business cycles, and economic stabilization, including land, labor and capital, and effects of government policies on the markets. Prerequisite: MATH 102 or higher.

ECON 202 Principles of Macroeconomics/Honors Credit 3
Students learn the principles of economics analysis and institutions and issues of public policy. Topics covered include production, market models, the allocation of resources, the distribution of income through the price system (micro analysis), and international economics. Prerequisite: MATH 102 or higher.

ECON 300 Intermediate Micro Economic Theory/Honors Credit 3
Students learn the general principles and analytical tools of price theory. Topics include an analysis of consumer behavior, business firms, and industry and factor markets. Prerequisites: ECON 201 and ECON 202.

ECON 301 Intermediate Macro Economic Theory Credit 3
This course includes analysis of the determination of national income, employment, and price levels from the viewpoints of classical, Keynesian, neo-classical and neo-Keynesian economists. Key topics include consumption, investment, inflation, and monetary and fiscal policies. Prerequisites: ECON 201 and ECON 202.

ECON 302 Money and Banking/Honors Credit 3
This course explores the role of money, credit and the banking system in the United States. The growth of the commercial bank is traced from the colonial times to the present. Topics included are demand deposit, bank investments, Federal Reserve System, and monetary and fiscal policies. Prerequisites: ECON 201 and ECON 202.

ECON 303 Labor Economics Credit 3
This course includes a study of the labor force in the United States with special reference to employment, wage structure, and historical and social background of trade unionism and labor legislation. Prerequisites: ECON 201 and ECON 202.

ECON 304 The Economics of Black America Credits 3
This course includes survey and analysis of economic conditions of Black people in the United States from 1906 to present. Topics covered include Black land ownership, income, education, wages, mobility, businesses, employment welfare, discrimination, the Civil Rights Act of 1964, the impact of Federal economic policy on Blacks, and the historical factors which shaped them. Prerequisites: ECON 201 and ECON 202.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

ECON 401 Interpretative Analysis of Economic Theories Credit 3
Students do an in-depth study of basic economic concepts and theories which will be applied to understanding current economic policies and issues. Topics in general include monetary policy, fiscal policy, the public debt, income distribution, black economic development, collective bargaining, various marketing structures, international trade, alternative economic systems, and the less developed countries. Prerequisites: ECON 201 and ECON 202.

ECON 402 Economics of Development Credit 3
This course involves a study of the economic factors involved in the development of an economy. Particular emphasis is placed upon the capital accumulation in economies at various stages of economic growth. The economic problems of the developing areas of the world are examined. Prerequisites: ECON 201 and ECON 202.

ECON 403 Economics of Public Finance Credit 3
The course involves a study of principles and practices of taxation and public expenditure. Topics include economic effects of public spending and debts, taxation, financing social security and other services, fiscal and monetary policies and their relation to inflation and social problems. Prerequisites: ECON 201 and ECON 202.

ECON 404 International Economics Credit 3
Students study international economic problems, policies and processes. Topics covered include foreign trade, the balance of payments, exchange rate and exchange controls, international economic organization, the relationship between domestic and international economic organization, and the relationship between domestic and international economic policies. Prerequisites: ECON 201 and ECON 202.

ECON 480 Directed Independent Study in Economics Credit 3
This course is designed to upgrade knowledge in a specialized area of study determined by deficiencies or projected area of growth and plans for further studies. It will be structured to meet the needs of the students taking the course. The enrolled student will be assigned to a faculty member with whom he will work out a specific plan of study. The course will be similar to tutorials in structure. The student will have the primary responsibility of completing the assignments. Credit hours may vary in accordance with the need and amount of work assigned. Prerequisite: Senior standing and permission of instructor.

ECON 490 Senior Seminar in Economics Credit 3
This course offers students the opportunity for individualized, in-depth study with presentation to and criticism by peers. Topics of current interest will be announced before registration. Prerequisite: Senior standing.

ENTOMOLOGY

ENTO 313 General and Applied Entomology Credit 3
This course consists of lectures and laboratory exercises that focus on biology, taxonomy, and management of insects. The fundamentals of integrated pest management will also be covered.

FOOD SCIENCE AND TECHNOLOGY

FDST 493 Food Chemistry Credit 3
This course explores the chemistry of food components including water, carbohydrates, lipids, proteins, vitamins, and minerals, as well as additives, including preservatives, colorants, flavors, antioxidants and sweeteners. Functionality and interaction of components and their importance to quality and wholesomeness of foods will be discussed. Prerequisites: CHEM 212 or permission of instructor.

HORTICULTURE

HORT 203 Introduction to Horticultural Science Credit 3
This course is designed to introduce the scientific principles and practices of horticulture as a scientific discipline. Plant relationships, structure, growth and development, as well as the artistic aspects will be discussed. The course is divided into three sections: 1) basic concepts and processes in plant science, 2) general managerial practices of horticultural crops, and 3) discussions of current topics in horticulture.

HORT 313 Floriculture and Ornamental Horticulture Credit 3
This course is an introduction to the concepts of ornamental plant production and floral design. It includes production, propagation, harvesting and marketing of ornamental plants. Previously listed as HORT 312. Two hours lecture and two hours lab per week.

HORT 333 Landscape Design Theory Credit 3
Students learn theory and principles of design, role of the environment in selecting plants and landscape materials, and basic graphic elements. Two hours lecture and two hours lab per week.

HORT 353 Turf Management and Maintenance Credit 3
This course shows students how to identify, select, establish and manage turf for commercial, recreational and residential use. Management factors such as renovation, drainage, irrigation, fertility, pest and disease control, as well as mowing and other maintenance procedures will be covered. Prerequisites: PLSC 184, PLSC 185 and SOIL 203 or permission of instructor. Two hours lecture and two hours lab per week.

HORT 383 Horticultural Therapy Credit 3
This course addresses the therapeutic role and application of horticulture to individuals; it includes therapy and rehabilitation of the physically, emotionally and mentally challenged individuals. Prerequisites: PLSC 184 and PLSC 185 or permission of instructor.

HORT 423 Horticultural Crops Credit 3
This course presents the scientific aspects of commercial fruit and vegetable production. Principles of economics and practices in the global marketing of vegetables, fruits and nuts are discussed in relation to the maintenance of a safe food supply. General aspects of regional vegetables and fruits are given special emphasis for the Delmarva Peninsula. Prerequisite: HORT 203 or permission of instructor. Two hours lecture and two hours lab per week.

HORT 463 Plant Tissue Culture Credit 3
This course explores the principles and methods for *in vitro* culture and propagation of important horticultural and agronomic crops. Prerequisites: PLSC 184 and PLSC 185 or permission of instructor. Two hours lecture and two hours lab per week.

NATURAL RESOURCES

NRES 403 Advanced Aquaculture Credit 3
This course covers the fundamentals of commercial fish and other marine animal production, including basic principles of pond and tank production, management, nutrition and disease control. Also listed as ANPT 403.

NRES 404 Conservation Biology Credit 3
The course is an introduction to the principles of conservation biology, with an emphasis on application of ecological principles, management tools and case history studies related to conservation issues. Prerequisite: BIOL 402 or equivalent. This course is cross-listed with BIOL 404.

NRES 473 Ornithology Credit 3
This course covers general biology, taxonomy, and natural history of birds, with an emphasis on North American families. This course is cross-listed with NRES 673. Prerequisites: BIOL 111, BIOL 113, BIOL 112, BIOL 114 or permission of instructor.

PLANT AND SOIL SCIENCE¹

PLSC 184 Introduction to Plant Science/Honors Credit 3
This course provides an introduction to fundamental biological principles as they relate to plant growth, reproduction and development, interaction of plants with their environment, and importance of plants to society, with specific reference to the role of plants in Maryland's economy. Impact of crop production practices on other natural resources will also be discussed.

PLSC 185 Introduction to Plant Science Lab Credit 1
This course deals with laboratory and field studies of plants, and related processes, including photosynthesis, nitrogen fixation, reproduction, classification, genetic variability, weed control and tillage practices. Co-requisite: PLSC 184.

PLSC 283 Agriculture and the Environment Credit 3
This course examines the impact of agricultural practices on humans and our natural resources. Emphasis is placed on providing and maintaining an adequate food supply while protecting the environment.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

PLSC 321 Integrated Pest Management Credit 3
This course is designed as an introduction to insect pests, disease causing organisms, weeds, and their management in crop plants using integrated practices. Topics will include classification, identification, biology, ecology, sampling methods, IPM development, management tactics, use of conventional pesticides, biological control, host plant resistance and legislative methods. It will also include biology and management of important insects, diseases and weeds in selected crops. The course meets for two lectures and for a two hour laboratory per week. Prerequisites: PLSC 184 and PLSC 185.

PLSC 474¹ Plant Pathology/Honors Credit 4
This course examines causes of diseases in agronomic and horticultural crops, to include symptom recognition, isolation and enumeration, and management of diseases in landscape and field crops. Lab exercises include preparation of a journal-type manuscript based on an individual research project. Prerequisites: PLSC 184 and PLSC 185 or permission of instructor. This course is cross-listed with PLSC 674. Three hours lecture and three hours lab per week.

PLSC 484 Internship in Agriculture and Natural Resources Credit 3-6
This course involves supervised work experience in an approved setting that is planned with a business, university, or government agency. A faculty advisor must pre-approve the internship opportunity. Prerequisite: Permission of instructor.

SOIL SCIENCE

SOIL 203 Introduction to Soil Science Credit 3
This course engages students in a study of soil forming factors, soil forming processes and minerals involved in soil development, weathering, soil physical and chemical properties, organic matter mineralization, and the impact of these factors on soil fertility, soil moisture holding ability, and pH. Prerequisites: CHEM 111 and CHEM 113 or permission of instructor. Three hours lecture per week.

SOIL 204 Introduction to Soil Science Laboratory Credit 1
This course will provide students with individual and group dynamic approaches to laboratory exercises that will be designed for students to acquire knowledge, comprehend, apply, analyze, synthesize, and evaluate aspect of soil profile development, soil forming factors, minerals, weathering, soil physical properties, chemical properties, organic matter mineralization, soil chemistry, and the impact of these factors on soil fertility, soil moisture content, and soil hydrogen ion concentration. Prerequisite: CHEM 111 and CHEM 113 or permission of instructor. Co-requisite: SOIL 203.

SOIL 443 Soil Chemistry Credit 3
This course provides students with knowledge of the chemical composition and formation of soils, knowledge of cation and anion exchange, soil acidity, soil alkalinity, soil salinity, soil conditions, and soil fixation of nutrients. Chemical methods of soil analysis are studied with emphasis on their relation to fertilizer requirements. Prerequisites: CHEM 112, CHEM 114 and SOIL 203.

¹ Honors (H) courses: Students will be given more assignments, take home problems, term papers, and exams and quizzes than regular students.

DIRECTORY OF FACULTY

- Acquah, Emmanuel** **Professor**
B.S., University of Maryland Eastern Shore, M.S. and Ph.D., The Ohio State University
- Allen, Arthur L.** **Associate Professor, 1890 Associate Research Director**
B.S., University of Arkansas at Pine Bluff; M.S., Oklahoma State University; Ph.D., University of Illinois-Urbana
- Clarke, Maurice F.** **Assistant Professor**
B.S., Tuskegee University; M.Sc., University of Edinburgh; DVM, Tuskegee University
- Cotton, Corrie P.** **Research Assistant Professor**
B.S., University of Maryland Eastern Shore; BLA, MLA, The Pennsylvania State University
- Dadson, Robert B.** **Professor**
B.S., University of London; M.Sc., Ph.D., McGill University
- Demissie, Ejigou** **Professor**
B.S., M.S., Ph.D., Oklahoma State University
- Escobar, Enrique N.** **Assistant Professor**
B.S., M.S., Universidad de El Salvador; Ph.D., University of Maryland, College Park
- Tao Gong** **Assistant Professor**
B.S., M.S., Harbin Institute of Technology, P.R. China; Ph.D., Middle Tennessee State University
- Green, Bessie** **Research Associate**
B.S., Salisbury State University; M.S., Ph.D., University of Maryland Eastern Shore
- Handwerker, Thomas** **Professor**
B.S., University of Tennessee; M.S., Ph.D., Cornell University
- Harter-Dennis, Jeannine** **Associate Professor**
B.S., M.S., Ph.D., University of Illinois
- Hashem, Fawzy** **Research Associate Professor**
B.S., University of Ain Shams; M.S., University of Cairo; Ph.D., University of Cairo; Ph.D., University of Maryland College Park
- Marsh, Lurline E.** **Professor and Chairperson**
B.S., University of the West Indies; M.S., Tuskegee University; Ph.D., University of Minnesota
- Mollett, Theodore A.** **Associate Professor**
B.S., Oregon State University; M.S., Ph.D., Purdue University
- Parveen, Salina** **Assistant Professor**
B.S., M.S., University of Dhaka; Ph.D., University of Florida
- Schwarz, Jurgen** **Associate Professor**
B.S., M.S., Hohenheim University; Ph.D., Cornell University
- Shorter, George** **Assistant Professor**
B.S., Maryland State College; M.S., Virginia State College; Ph.D., Iowa State University
- Tubene, Stephan L.** **Associate Professor**
B.S., Institut Facultaire des Sciences Agronomiques de Yangambi; M.S., Alcorn State University; Ph.D., Kansas State University

DEPARTMENT OF HUMAN ECOLOGY

<http://www.umes.edu/SANS>

Dr. Nina Lyon Bennett, Acting Chairperson

MISSION

The mission of the Department of Human Ecology is to prepare students for careers, graduate study and leadership roles in Fashion Merchandising, Child Development, Family and Consumer Sciences, and Food and Nutrition. The department challenges faculty and students to make contributions that will enhance the quality of life of individuals and families in diverse societies. Our focus is to empower individuals to cope with change, explore new technologies, and manage resources wisely.

The philosophical tenets and programmatic focus remain central to the mission of the 1890-land grant university. This mission is carried out through teaching, research and community service.

OBJECTIVES

The objectives of the Human Ecology Department are to:

1. Establish and promote high academic standards and performance.
2. Provide career development opportunities for students, faculty and staff.
3. Strengthen and expand research and community service programs.
4. Increase enrollment and graduation rates.

DEGREES OFFERED

Bachelor of Science – Human Ecology

CERTIFICATION

Family Financial Planning Certificate

DEPARTMENTAL REQUIREMENTS

Department of Human Ecology programs require that all students maintain a “C” in each course in their Program Core and Program Electives and a “C” average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA.

All students who enroll in degree programs will be required to complete 12 alternative credits before graduating. Alternative credits can be earned by completing internships, summer and winter session courses, on-line courses/undergraduate research, and courses completed while studying abroad. All students should consult their advisor when selecting these credits.

CHILD DEVELOPMENT PROGRAM

The program in Child Development provides a broad interdisciplinary background in the area of children and families. As the only four-year program in Maryland, it prepares students to work and/or teach others to work with children and their families. Emphases are given to development within various family structures and to strategies for facilitating normal development. Students learn basic and applied concepts of human development and acquire skills in working with young children and their families with different abilities, and backgrounds in a variety of settings. In addition to classroom instruction, the Child Development students spend part of several semesters working in the campus Child and Family Development Center and in off-campus social and human service agencies. Students choosing this option can broaden their career possibilities by completing courses in cognitive areas such as business, recreation, or nutrition that compliment the training in Child Development. Successful completion of the Child Development program also provides excellent preparation for graduate studies.

DEPARTMENTAL REQUIREMENTS The Child Development Program requires that all students maintain a “C” in each course in their Program Core and Program Electives and a “C” average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA.

Child Development students are required to complete 400 clock-hours of internship and practicum experience designed to provide on-the-job experience in the childcare/education field. Students must include a minimum of 12 credits of out-of-class experiences for credit. HUEC 400 and HUEC 450, five credits each, meet the out-of-class experience. Students should consult their advisor to select two (2) additional credits to meet the 12 credit hour requirement.

CAREER OPPORTUNITIES

Potential employment opportunities include private child care facilities, hospital and clinic settings, recreation programs, health and social service agencies, and businesses. Students choosing this option can broaden their career possibilities by completing courses in cognate areas such as business, recreation, or nutrition that complement the training in Child Development. In addition, successful completion of the Child Development program provides excellent preparation for graduate studies.

REQUIRED MAJOR COURSES

CHDE 220	CHDE 323	CHDE 427	HUEC 203
CHDE 222	CHDE 325	CHDE 430	HUEC 361
CHDE 224	CHDE 327	CHDE 440	HUEC 370
NUDT 214	CHDE 330		HUEC 399
	CHDE 332		HUEC 400 ¹
			HUEC 409
			HUEC 450 ¹
			HUEC 464

¹Child Development majors must complete HUEC 400 and HUEC 450 for five (5) credits each.

CURRICULUM GUIDE FOR CHILD DEVELOPMENT

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 101	3	CHDE 220	3
BIOL 103	1	ENGL 102	3
EXSC 111 ¹	3	ENGL 001	0
ENGL 101	3	MATH 102 or Higher	3
GEN ED CURR AREA I	3	PSYC 200	3
HUEC 100	1	HUEC 230	<u>3</u>
SOCI 101	<u>3</u>		15
	17		

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
HUEC 203	3	BUED 212	3
CHDE 222	3	Elective	3
CHDE 224	3	GEN ED CURR AREA I	3
ENGL 203	3	GEN ED CURR AREA III	3
NUDT 214	<u>3</u>	Elective	<u>3</u>
	15		12

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 323	3	CHDE 325	3
CHDE 327	3	CHDE 332	3
CHDE 330	3	CHDE 361	3
ENGL 305	3	HUEC 399	1
HUEC 370	<u>2</u>	HUEC 464	3
	14	Elective	<u>3</u>
			16

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 427	3	HUEC 400 ^{2, 3, 4}	5
CHDE 430	3	HUEC 409	1
CHDE 440	3	HUEC 450 ^{2, 3, 4}	<u>5</u>
Elective	6		11
HUEC 474	<u>2</u>		
	17		

Total Credit Hours: 120

¹EDHE 111 cannot be repeated for credit.

²Child Development majors cannot complete HUEC 400, HUEC 409, and HUEC 450 until all professional courses have been successfully completed.

³HUEC 400 and HUEC 450 meet the out-of-class experience. Students should consult their advisor to select two (2) additional credits to meet the 12 credit hour requirement.

⁴Child Development majors must complete HUEC 400 and HUEC 450 for five (5) credits each.

CHILD DEVELOPMENT

Articulated Program with Wor-Wic Community College

The University of Maryland Eastern Shore and Wor-Wic Community College entered into an articulation agreement to facilitate the transfer of Early Childhood Education students from Wor-Wic Community College to UMES for the purpose of entering the bachelor's degree program in Human Ecology - Child Development.

Students enrolled in Wor-Wic Community College Early Childhood Education Associate of Applied Science Program (AAS) can transfer to UMES for completion of the bachelor's degree in Human Ecology - Child Development, following completion of the AAS program. A maximum of 60 credits of successful community college study can be transferred to UMES.

DEPARTMENTAL REQUIREMENTS

The Child Development Program requires that all students maintain a "C" in each course in their Program Core and Program Electives and a "C" average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA.

Child Development majors are required to complete HUEC 400 and HUEC 450 for 5 credits each. Students transferring from Wor-Wic may earn credit for these courses through a departmental challenge examination at UMES per the UMES-WWCC Articulation Agreement. Students are encouraged to take CHDE 220, CHDE 222 and CHDE 224 prior to fall enrollment at UMES. Wor-Wic transfer students may earn credit for courses through a departmental challenge examination at UMES, per the UMES-WWCC Articulation Agreement.

CAREER OPPORTUNITIES

Potential employment opportunities include private child care facilities, hospital and clinic settings, recreation programs, health and social service agencies, and businesses. Students choosing this option can broaden their career possibilities by completing courses in cognate areas such as business, recreation, or nutrition that complement the training in Child Development. In addition, successful completion of the Child Development program provides excellent preparation for graduate studies.

REQUIRED MAJOR COURSES

CHDE 220 ¹	CHDE 323	CHDE 427	HUEC 203
CHDE 222 ¹	CHDE 325	CHDE 430	HUEC 361
CHDE 224 ¹	CHDE 327 ²	CHDE 440	HUEC 370
NUDT 214	CHDE 330		HUEC 400 ³
	CHDE 332 ²		HUEC 450 ³
			HUEC 464

¹Students are encouraged to complete course prior to the Fall enrollment at UMES.

²Wor-Wic transfer students may earn credit for these courses through a departmental challenge examination at UMES.

³Child Development majors must complete HUEC 400 and HUEC 450 for five (5) credits each.

**CURRICULUM GUIDE FOR CHILD DEVELOPMENT 2+2
Articulated Program with Wor-Wic Community College (WWCC)**

FRESHMAN YEAR (at WWCC)

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CMP 101	3	CDV 101	1
EDU 101	3	EDU 151	3
EDU 102	3	EDU 152	3
EDU 103	3	EDU 153	3
ENG 101	<u>3</u>	ENG 151	3
	15	PSY 101	<u>3</u>
			16

SOPHOMORE YEAR (at WWCC)

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIO 101	4	EDU 251	3
EDU 201	3	EDU 252	3
EDU 260	3	EDU 261	3
PSY 205	3	MTH 103	3
SPH 101	<u>3</u>	SCI ELE	<u>4</u>
	16		16

JUNIOR YEAR (at UMES)

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 323	3	CHDE 325	3
CHDE 327 ¹	3	CHDE 332 ¹	3
CHDE 330	3	HUEC 361	3
HUEC 203	3	HUEC 399	1
SOCI 101 ²	3	HUEC 464	3
EXSC 111 ^{2,3}	3	GEN ED CURR AREA I ²	<u>3</u>
ENGL 002	<u>0</u>		16
	18		

SENIOR YEAR (at UMES)

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 427 ¹	3	HUEC 400 ⁴	5
CHDE 430	3	HUEC 409	1
CHDE 440	3	HUEC 450 ⁴	5
ENGL 305	3	GEN ED CURR AREA I	<u>3</u>
HUEC 370	2		14
HUEC 474	<u>2</u>		
	16		

Total Credit Hours: 127

¹ Wor-Wic transfer students may earn credit for these courses through a departmental challenge examination at UMES.

² Students are encouraged to complete prior to fall enrollment at UMES.

³ EXSC 111 cannot be repeated for credit.

⁴ Child Development majors must complete HUEC 400 and HUEC 450 for five (5) credits.

CHILD DEVELOPMENT

Articulated Program with Chesapeake College

The University of Maryland Eastern Shore and Chesapeake College entered into an articulation agreement to facilitate the transfer of Early Childhood Education students from Chesapeake College to UMES for the purpose of entering the bachelor's degree program in Human Ecology - Child Development.

Students enrolled in Chesapeake College Early Childhood Education Associate of Applied Science Program (AAS) can transfer to UMES for completion of the bachelor's degree in Human Ecology - Child Development, following completion of the AAS program. A maximum of 60 credits of successful community college study can be transferred to UMES.

DEPARTMENTAL REQUIREMENTS

The Child Development Program requires that all students maintain a "C" in each course in their Program Core and Program Electives and a "C" average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA.

Child Development majors are required to complete HUEC 400 and HUEC for five (5) credits each. Students transferring from Chesapeake College may earn credit for these courses through a departmental challenge examination at UMES per the UMES-CC Articulation Agreement. Students are encouraged to take CHDE 220, CHDE 222 and CHDE 224 prior to fall enrollment at UMES. Chesapeake College transfer students may earn credit for courses through a departmental challenge examination at UMES per the UMES-CC Articulation Agreement.

CAREER OPPORTUNITIES

Potential employment opportunities include private child care facilities, hospital and clinic settings, recreation programs, health and social service agencies, and businesses. Students choosing this option can broaden their career possibilities by completing courses in cognate areas such as business, recreation, or nutrition that complement the training in Child Development. In addition, successful completion of the Child Development program provides excellent preparation for graduate studies.

REQUIRED MAJOR COURSES

CHDE 220 ¹	CHDE 323	CHDE 427	HUEC 203
CHDE 222 ¹	CHDE 325	CHDE 430	HUEC 361
CHDE 224 ¹	CHDE 327	CHDE 440	HUEC 370
NUDT 214	CHDE 330		HUEC 399
	CHDE 332		HUEC 400 ²
			HUEC 409
			HUEC 450 ²
			HUEC 464

¹Students are encouraged to complete course prior to Fall enrollment at UMES.

²Child Development majors complete HUEC 400 and HUEC 450 for 5 credits each.

**CURRICULUM GUIDE FOR CHILD DEVELOPMENT
Articulated Program with Chesapeake College (CC)**

FRESHMAN YEAR (at Chesapeake)			
<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
FSC 101	1	CPL 201	1
ECD 101	3	ECD 105	3
ECD 160	3	PSY 150	3
ENG 101	3	ECD 180 ¹	3
ECD 163	3	SOC 161	3
ART/HUM	<u>3</u>	ENG 102	<u>3</u>
	16		16

SOPHOMORE YEAR (at Chesapeake)			
<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
NAT/SCI	4	ECD 165	3
EDU 214/215	3	CPL 280	3
ECD 270	3	MAT 200	3
ECD 161	3	SCI ELE	4
COM 101	3	ECD 171	<u>3</u>
PED 103	<u>3</u>		16
	19		

JUNIOR YEAR (at UMES)			
<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 323	3	CHDE 325 ²	3
CHDE 327	3	CHDE 332 ²	3
CHDE 330	3	HUEC 230	3
ENGL 002	0	HUEC 361	3
HUEC 203	3	HUEC 399	1
GEN ED CURR AREA I	<u>3</u>	HUEC 464	<u>3</u>
	15		16

SENIOR YEAR (at UMES)			
<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 427	3	ENGL 305	3
CHDE 430 ²	3	HUEC 409	1
CHDE 440 ²	3	HUEC 450 ³	<u>5</u>
BUED 212	3		9
HUEC 370	2		
HUEC 474	<u>2</u>		
	16		

Total Credit Hours: 123

¹Chesapeake College recommends HTH 111 vs. HTH 180/ECD 180. If you plan to transfer to UMES we suggest you take ECD 180.

²Chesapeake College transfer students may earn credit for these courses through a departmental challenge examination per the UMES-CC Articulation Agreement.

³Child Development majors complete HUEC 400 and HUEC 450 for five (5) credits each.

DIETETICS

The Didactic Program in Dietetics at the University of Maryland Eastern Shore is housed within the Department of Human Ecology, which in turn, is located in the School of Agricultural and Natural Sciences.

The mission of the program is to provide educational opportunities for students to develop mastery of food and nutrition principles, and acquire skills for effective dietetics practice; enhance leadership qualities; and foster career development. Its philosophical tenets remain central to the mission of the 1890 Land-Grant Institution.

The Didactic Program in Dietetics is currently granted approval status by the Commission on Accreditation/Approval for Dietetics Education of the American Dietetic Association (ADA), 216 W. Jackson Blvd., Chicago, IL 60606-6995, 312/899-4876. Students who fulfill the prescribed course requirements will be awarded the Bachelor of Science Degree in Human Ecology Dietetics.

Successful completion of the Didactic Program is the first step toward dietetic credentialing. The remaining two steps consist of completing a supervised practice experience through an ADA-accredited Dietetic Internship, or an ADA-approved Pre-Professional Practice Program (AP4). Some of the agencies which provide internship experience for Dietetic interns are Peninsula Regional Medical Center, McCready Hospital, Dorchester General Hospital, Dorchester Health Department, and Renal Treatment Center. The final step in the credentialing process is to successfully write the Registration Examination for Dietitians.

DEPARTMENTAL REQUIREMENTS

Program admission requirements are the same as those for the university. Freshman applicants must have graduated from an accredited secondary school. For optimal admission consideration, an academic grade point average (GPA) of at least 2.5, and a Scholastic Aptitude Test (SAT) score of at least 850, or an American College Test (ACT) score of at least 18, is expected.

Students who have attended a regionally accredited institution of higher education and attempted 12 or more credits may be considered for admission as transfer students. Applicants must be in good academic and disciplinary standing at their previous institution and must have maintained a 2.5 GPA or higher in all previous college work. Those who have earned fewer than 28 credits must submit their high school transcript and SAT or ACT scores as well.

Individuals who hold a bachelor's degree in another discipline may elect to satisfy the ADA Foundation Knowledge and Skills for the Didactic Component of Entry-Level Dietitian Education in lieu of pursuing a second bachelor's degree. The applicant must have achieved a minimum GPA of 2.75 on a 4.0 scale prior to program entrance. Program graduates are eligible to receive a Verification Statement upon successful completion of the dietetics program with a GPA of 3.0.

Acceptance into the Dietetics program requires a GPA of 2.75. Program graduates are eligible to receive a Verification Statement upon successful completion of the dietetics program with a GPA of 3.0. These two GPA requirements will be effective beginning Fall 2009.

OUT-OF-CLASS EXPERIENCE

Students must include a minimum of 12 credits of out-of-class experiences for credit. Students should consult advisor to select six (6) additional credits to meet the 12 credit hours requirements.

CAREER OPPORTUNITIES

Program graduates are eligible to apply for Dietetic Internship programs and, upon successful completion of the internship, are qualified to write the dietetic registration examination. Registered dietitians are employed by industry, public health services, hospitals, food and health services, and other local, state, national and international agencies in research and educational programs.

REQUIRED MAJOR COURSES

NUDT 210	NUDT 300	NUDT 401	HUEC 370
NUDT 211	NUDT 305	NUDT 402	HUEC 399 ¹
NUDT 212	NUDT 310	NUDT 471	HUEC 400 ¹
	NUDT 391	NUDT 473	HUEC 409 ¹
	NUDT 392		HUEC 464

¹Dietetics students may substitute NUDT 475 for four (4) credits.

CURRICULUM GUIDE FOR DIETETICS

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101	3	BIOL 111	3
MATH 109 or Higher	3	BIOL 113	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
SOCI 101	3	EXSC 111 ¹	3
HUEC 100	<u>1</u>	ENGL 001	0
	14	ENGL 102	3
		NUDT 210	<u>3</u>
			17

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 231	3	BIOL 232	3
BIOL 233	1	BIOL 234	1
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
ENGL 203	3	PSYC 200	3
NUDT 211	3	NUDT 212	3
GEN ED CURR AREA I	<u>3</u>	NUDT 305	<u>3</u>
	17		17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 341	3	ENGL 305	3
CHEM 343	1	MATH 210	3
HUEC 370	2	NUDT 392	3
NUDT 300	1	NUDT 401	3
NUDT 310	3	GEN ED CURR AREA I	<u>3</u>
NUDT 391	<u>3</u>		15
	13		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AMIC 324 or		HUEC 464	3
BIOL 301 and	3	HUEC 487	3
BIOL 303	1	NUDT 473	3
HUEC 474	2	NUDT 475 ^{2, 3}	<u>4</u>
NUDT 402	3		13
NUDT 471 ³	3		
NUDT 472	<u>2</u>		
	14		

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.

²Dietitics students may substitute NUDT 475 for four (4) credits.

³NUDT 471 and NUDT 475 meet the Out-of-Class Experience.

FAMILY AND CONSUMER SCIENCES

The Family and Consumer Sciences program is designed to provide the student with an interdisciplinary perspective for professional work with families and consumers. Students develop a comprehensive background while focusing on one's specific interest(s). Graduates of the Family and Consumer Sciences program will be prepared to work in either the public or private sector environments that serve families and consumers. Students may select a minor to strengthen their general education, core and required coursework. Depending on the students' interest, the minor may be chosen from one of the following areas: Child Development, Dietetics, Fashion Merchandising, Nutrition or Gerontology. Early advisement is highly recommended.

DEPARTMENTAL REQUIREMENTS The Family and Consumer Sciences Program require that all students maintain a "C" in each course in their Program Core and Program Electives and a "C" average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA. All students are required to complete a 200 clock-hour internship.

CAREER OPPORTUNITIES

Graduates of the Family and Consumer Sciences program will be prepared to work in either the public or private sector that serves families and consumers. Students may select a minor or choose free electives to strengthen their general education core and required course work.

REQUIRED MAJOR COURSES

CHDE 222	FMCT 201 ¹ or	HUEC 101	NUDT 210
PSYC 303	FMCT 381 ¹	HUEC 203	NUDT 211
SOCI 361 ²		HUEC 243	NUDT 212
		HUEC 310	NUDT 305
		HUEC 361	
		HUEC 370	
		HUEC 399	
		HUEC 400	
		HUEC 460 ²	
		HUEC 464	
		HUEC 487	
		HUEC 490	

¹Student may select either FMCT 201 or FMCT 381.

²Student may select either SOCI 361 or HUEC 460.

CURRICULUM GUIDE FOR FAMILY AND CONSUMER SCIENCES

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101	3	EXSC 111 ¹	3
SOCI 101	3	ENGL 102	3
HUEC 100	1	ENGL 001	0
HUEC 101	3	GEN ED CURR AREA I	3
GEN ED CURR AREA III	<u>4</u>	GEN ED CURR AREA III	3
	14	MATH 109 or Higher	<u>3</u>
			15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	CHDE 222	3
ECON 202	3	HUEC 243	3
ENGL 203	3	HUEC 203	3
PSYC 200	3	HUEC 230	3
GEN ED CURR AREA I	<u>3</u>	NUDT 210	<u>3</u>
	15		15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
HUEC 310	3	FMCT 201 or	
HUEC 370	2	FMCT 381	3
NUDT 211	3	HUEC 399	1
PSYC 303	3	NUDT 212	3
Elective/Minor Course ²	<u>3</u>	NUDT 305	3
	14	Elective/Minor Course ²	<u>6</u>
			16

SUMMER

HUEC 400³ 3

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
HUEC 361	3	HUEC 460 or	
HUEC 409	1	SOCI 361	3
ENGL 305	3	HUEC 464	3
Electives/Minor Courses ²	<u>6</u>	HUEC 487	3
	13	HUEC 490	3
		Elective/Minor Courses ²	<u>3</u>
			15

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.

²Students who select a Minor, must complete a minimum of 18 credit hours.

³HUEC 400 meets the Out-of-Class Experience. Please consult your advisor to select nine (9) additional credits to meet the 12 credit hours requirement.

FAMILY AND CONSUMER SCIENCES EDUCATION PROGRAM

The Family and Consumer Sciences Education Program (FCS) provides educational opportunities designed to fulfill the needs of society in general and the State of Maryland in particular for FCS teachers. The program (1) offers a hands-on experience, performance-based program that will prepare prospective FCS teachers with the knowledge and skills needed to address some of life's most difficult tasks; and (2) enhances the quality of life for individuals and families in regard to resource management; living environments; individual, child and family development; nutrition and food; and textiles at the secondary level. The knowledge, skills, and processes acquired through Family and Consumer Sciences Education are applicable to the management of personal and family lives as well as work responsibilities.

DEPARTMENTAL REQUIREMENTS

The Family and Consumer Science Education Program require that all students maintain a "C" in each course in their Program Core and Program Electives and a "C" average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA.

REQUIRED MAJOR COURSES

CHDE 222	FMCT 201 ¹	HUEC 243	NUDT 210
CHDE 323	FMCT 361	HUEC 310	NUDT 211
	FMCT 381 ¹	HUEC 361	
		HUEC 370	
		HUEC 399	
		HUEC 400	
		HUEC 409	
		HUEC 464	
		HUEC 474	
		HUEC 490	

EDUCATION REQUIRED EDUCATION COURSES

EDCI 200	EDSP 428	PSYC 305 ²	HUEC 203 ²
EDCI 201 ³		PSYC 307	
EDCI 311			
EDCI 400			
EDCI 406			
EDCI 409			
EDCI 410			
EDCI 427			
EDCI 480 ⁴			
EDCI 490 ⁴			

¹Students may select either FMCT 201 or FMCT 381.

²Students may select either HUEC 203 or PSYC 305.

³Course does not count toward graduation.

⁴FCS Education majors must complete EDCI 480 and 490 as part of their Professional Education courses.

CURRICULUM GUIDE FOR FAMILY AND CONSUMER SCIENCES EDUCATION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 101	3	CHEM 101	3
BIOL 103	1	EXSC 111 ¹	3
ENGL 101	3	ENGL 102	3
HUEC 100	1	ENGL 001	0
PSYC 200	3	HUEC 230	3
SOCI 101	<u>3</u>	MATH 102 or Higher	<u>3</u>
	14		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	CHDE 222	3
EDCI 200	3	ENGL 305	3
EDCI 201 ²	1	FMCT 201 or	
ENGL 203	3	FMCT 381	3
HUEC 203	3	HUEC 243	3
NUDT 211	<u>3</u>	GEN ED CURR AREA I	3
	16	NUDT 210	<u>3</u>
			18

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHDE 323	3	EDCI 406	3
GEN ED CURR AREA I	3	EDCI 409	3
FMCT 361	3	HUEC 464	3
HUEC 370	2	HUEC 361	3
HUEC 310	3	HUEC 490	<u>3</u>
HUEC 474	<u>2</u>		15
	16		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
EDCI 311	3	EDCI 400	3
EDCI 410	3	EDCI 480 ^{3,4}	6
EDCI 427	3	EDCI 490 ^{3,4}	<u>6</u>
EDSP 428	3		15
PSYC 307	<u>3</u>		
	15		

Total Credit Hours: 124

¹EXSC 111 cannot be repeated for credit.

²Course does not count towards graduation.

³FCS Education majors must complete EDCI 480 and 490 as part of their Professional Education courses in lieu of HUEC 399, 400 and 409.

⁴EDCI 480 and EDCI 490, six (6) credits each, meet the Out-of-Class Experience criteria.

FASHION MERCHANDISING PROGRAM

The Fashion Merchandising Program is designed to prepare students for entry-level management positions in the broad field of fashion merchandising, with emphasis on the retail process of products and services. It includes a minor in business administration, as well as an internship in Fashion Merchandising or a related area.

In addition, the department participates in the Fashion Institute of Technology (FIT) Visiting Student Program (located in New York City). Fashion Merchandising majors who meet eligibility requirements may opt to spend one year (junior year) at FIT for an additional degree (A.A.S.) in Advertising and Marketing Communications. Students return to the University of Maryland Eastern Shore (UMES) to complete the four-year program and receive both degrees at graduation. To compliment their program, students may choose to complete electives that focus on advertising, journalism, communication, or visual presentation. With appropriate courses taken as electives, students can pursue careers in fashion reporting, advertising, or graphic design.

DEPARTMENTAL REQUIREMENTS

The Fashion Merchandising Program requires that all students maintain a “C” in each course in their Program Core and Program Electives and a “C” average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA. Students are required to complete an internship designed to provide on-the-job experience in the fashion/textile industry. Some of the businesses which provide internship experience for students are: Bloomingdale’s, Macy’s, J. C. Penney, Liz Claiborne, Black Entertainment Television (BET), Foot Locker, Sears, Nordstrom, and The Gap.

STUDY TOURS

The Fashion Merchandising Program provides students with an opportunity to participate in a minimum of one major study tour each year. Students in the department tour the fashion capital of New York City. During this tour, students have an opportunity to visit and tour the facilities of well-known fashion designers such as Liz Claiborne and Donna Karan, along with several manufacturing facilities of design houses, furriers, computerized facilities of Butterick-Vogue and Simplicity pattern companies, and fashion museums are among the places visited.

Students in the textile courses visit textile mills in the Spring semester. Included in this tour is a look into production and development of various textile materials from fiber to garment. Among the companies visited are J.P. Stevens, Cannon Mills, Burlington, Americal Corporation, DuPont, and Allied Co.

CAREER OPPORTUNITIES

Fashion Merchandising program is designed to prepare students for entry level management positions in the broad field of fashion merchandising, with emphasis on the retail products and services. It includes a minor in business administration, as well as an internship in Fashion Merchandising or related areas. To complement their program, students may opt to complete electives that focus on advertising, journalism, communication or visual presentation. With the appropriate courses completed as electives, students can also pursue careers in fashion reporting, advertising and graphic design.

REQUIRED MAJOR COURSES

FMCT 141	FMCT 300	FMCT 441	HUEC 101
	FMCT 341		HUEC 310
	FMCT 342		HUEC 370
	FMCT 361		HUEC 399
	FMCT 381		HUEC 400
	FMCT 382		HUEC 409
			HUEC 464
			HUEC 487
			HUEC 490

CURRICULUM GUIDE FOR FASHION MERCHANDISING

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101	3	EXSC 111 ¹	3
FMCT 141	3	ENGL 102	3
HUEC 101	3	ENGL 001	0
HUEC 100	1	GEN ED CURR AREA I	3
SOCI 101	<u>3</u>	GEN ED CURR AREA III	4
	13	MATH 109	<u>3</u>
			16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	ECON 202	3
ENGL 203	3	FMCT 300	3
PSYC 200	3	ENGL 305	3
ACCT 201	3	Elective	3
GEN ED CURR AREA III	<u>3</u>	GEN ED CURR AREA I	<u>3</u>
	15		15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
FMCT 341	3	FINA 340	3
FMCT 361	3	FMCT 342	3
FMCT 381	3	FMCT 382	3
HUEC 310	3	HUEC 370	2
MKTG 308	<u>3</u>	HUEC 399	1
	15	BUAD Elective ²	<u>3</u>
			15

SUMMER

HUEC 400	3
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SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUAD 302	3	BUAD 304	3
BUAD 412	3	HUEC 464	3
FMCT 441	3	HUEC 487	3
HUEC 409	1	HUEC 490	3
BUAD Elective ²	<u>3</u>	Elective	<u>3</u>
	13		15

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.
²Student must select a 300 or 400 Level BUAD course.

FASHION MERCHANDISING HONORS

The Fashion Merchandising Honors Program is designed to prepare students for entry-level management positions in the broad field of fashion merchandising, with emphasis on the retail process of products and services. It includes a minor in business administration, as well as an internship in Fashion Merchandising or a related area. To complement the program, students may opt to complete electives that focus on advertising, journalism, communication, or visual presentation. With appropriate courses completed as electives, students can pursue careers in fashion reporting, advertising or graphic design.

In addition, the department participates in the Fashion Institute of Technology (FIT) Visiting Student Program (located in New York City). Fashion Merchandising majors who meet eligibility requirements may opt to spend one year (junior year) at FIT for an additional degree (A.A.S.) in Advertising and Marketing Communications. Students return to the University of Maryland Eastern Shore (UMES) to complete the four-year program and receive both degrees at graduation. To compliment their program, students may choose to complete electives that focus on advertising, journalism, communication, or visual presentation. With appropriate courses taken as electives, students can pursue careers in fashion reporting, advertising, or graphic design.

DEPARTMENTAL REQUIREMENTS

The Fashion Merchandising Honors Program requires that all students maintain a “C” in each course in their Program Core and Program Electives and a “C” average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA. Students are required to complete an internship designed to provide on-the-job experience in the fashion/textile industry. Some of the businesses which provide internship experience for students are: Bloomingdale’s, Macy’s, J. C. Penney, Liz Claiborne, Black Entertainment Television (BET), Foot Locker, Sears, Nordstrom, and The Gap. Students majoring in the Fashion Merchandising Hours program are required to register for designated Honors courses. Students must include a minimum of 12 credits of Out-of-Class Experience. Students should consult their advisor when selecting the Out-of-Class Experience courses.

STUDY TOURS

The Fashion Merchandising Honors Program provides students with an opportunity to participate in a minimum of one major study tour each year. Students in the department tour the fashion capital of New York City. During this tour, students have an opportunity to visit and tour the facilities of well-known fashion designers such as Liz Claiborne and Donna Karan, along with several manufacturing facilities of design houses, furriers, computerized facilities of Butterick-Vogue and Simplicity pattern companies, and fashion museums are among the places visited.

Students in the textile courses visit textile mills in the Spring semester. Included in this tour is a look into production and development of various textile materials from fiber to garment. Among the companies visited are J.P. Stevens, Cannon Mills, Burlington, Americal Corporation, DuPont, and Allied Co.

REQUIRED MAJOR COURSES

FMCT 141	FMCT 300	FMCT 441	HUEC 101
	FMCT 341H		HUEC 310H
	FMCT 342H		HUEC 370
	FMCT 361		HUEC 399
	FMCT 381		HUEC 400 ¹
	FMCT 382H		HUEC 409
			HUEC 464
			HUEC 487H
			HUEC 490H

¹HUEC 400, three (3) credits, meets the Out-of-Class Experience. Students should consult their advisor to select nine (9) additional credits to meet the 12 credit requirement.

CURRICULUM GUIDE FOR FASHION MERCHANDISING HONORS

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101H	3	EXSC 111 ¹	3
FMCT 141	3	ENGL 102H	3
HUEC 100	1	ENGL 001	0
HUEC 101	3	GEN ED CURR AREA I	3
SOCI 101	<u>3</u>	GEN ED CURR AREA II	4
	13	MATH 109	<u>3</u>
			16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUED 212	3	FMCT 300	3
ENGL 203	3	ECON 202H	3
GEN ED CURR AREA III	3	ENGL 305	3
ACCT 201	3	MATH 210	3
PSYC 200	<u>3</u>	MUSI 101H	<u>3</u>
	15		15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
FMCT 341H	3	FMCT 342H	3
FMCT 361	3	FMCT 382H	3
FMCT 381	3	HUEC 399	1
HUEC 370	2	FINA 340H	3
MKTG 308	<u>3</u>	BUAD Elective ²	3
	14	Elective	<u>3</u>
			16

SUMMER

HUEC 400 ³	3
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SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUAD 302H	3	BUAD 304	3
BUAD 412	3	HUEC 464	3
FMCT 441	3	HUEC 487H	3
HUEC 310H	3	HUEC 490H	<u>3</u>
HUEC 409	1		12
BUAD Elective ²	<u>3</u>		
	16		

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.

²Student must select a BUAD 300 or 400 Level course.

³ HUEC 400 meets the Out-of-Class Experience requirement for three credits.

FASHION MERCHANDISING FIT ADVERTISING MARKETING COMMUNICATIONS

The Fashion Merchandising FIT Advertising & Marketing Communications program is a dual degree program completed in conjunction with the Fashion Institute of Technology in New York City. Fashion Merchandising majors who meet eligibility requirements may opt to spend one year (junior year) at FIT for an additional degree (A.A.S.) in Advertising and Marketing Communications. Students return to UMES to complete the four-year program and receive both degrees at graduation. This program prepares students for entry level management positions in the broad field of fashion merchandising, advertising, and marketing communications, with a minor in business administration.

DEPARTMENTAL REQUIREMENTS

To be eligible to participate in the **Fashion Institute of Technology (FIT) Visiting Student Program**, you must meet the following criteria:

- Must be a full-time student at UMES in the Department of Human Ecology prior to their participation in the Visiting Student Program.
- Must be in good academic standing with a minimum cumulative GPA of a 2.9 and a major GPA of 3.0 on a 4.0 point scale.
- Must complete all forms and meet deadlines listed below in order to be considered for admissions. (See faculty coordinator for related forms).
- **Must complete the last 30 credit hours of course work for his or her degree at UMES.**

Upon acceptance to the University and entrance into the Department of Human Ecology, students should inform their academic advisor prior to registration of your interest in participating in the Visiting Student Program. Make an appointment with the faculty coordinator **prior to November 15th** of the Sophomore year for details and to receive all forms and applications pertaining to the program. Submit all application and financial aid materials by January 15th.

CAREER OPPORTUNITIES

Possible career opportunities include merchandiser, buying stylist, fashion consultant, public relations, marketing, journalism, and broadcasting.

REQUIRED MAJOR COURSES

FMCT 141	FMCT 300	FMCT 441	HUEC 101
	FMCT 341		HUEC 310
	FMCT 361		HUEC 370
	FMCT 381		HUEC 399 ¹
	FMCT 382		HUEC 400 ¹
			HUEC 409
			HUEC 464
			HUEC 487
			HUEC 490

FIT REQUIRED MAJOR COURSES

AC 111	AC 221	AD 101	FM 114 (FMCT 141)
AC 113	AC 231	CD 122	IC 291/491
AC 141	AC 271		
AC 171	AC 272		
	AC 362		

¹FIT students substitute IC 291/491 for HUEC 399 & 400 for four (4) credits.

**CURRICULUM GUIDE FOR FASHION MERCHANDISING
FIT ADVERTISING AND MARKETING COMMUNICATIONS**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101	3	MATH 109	3
HUEC 101	3	ENGL 102	3
SOCI 101	3	ENGL 001	0
HUEC 100	1	EXSC 111 ¹	3
BUED 212	3	GEN ED CURR AREA I	3
GEN ED CURR AREA I	<u>3</u>	GEN ED CURR AREA III	<u>4</u>
	16		16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ACCT 201	3	BUAD Elective ²	3
ENGL 203	3	BUAD Elective ²	3
ECON 202	3	FMCT 300	3
PSYC 200	3	FMCT 361	3
HUEC 310	3	HUEC 370	2
GEN ED CURR AREA III	<u>3</u>	MKTG 308	<u>3</u>
	18		17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AC 111	3	AC 113	3
AC 141	3	AC 231 ³	3
AC 171	3	AC 271	3
AC 221 ⁴	3	AC 272	3
CD 122	2	AC 362 ⁵	3
FM 114 ⁶ (FMCT 141)	<u>3</u>	IC 291/141 ⁷	<u>4</u>
	17		19

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BUAD 302	3	BUAD 304	3
HUEC 409	1	BUAD 412	3
FINA 340	3	FMCT 382	3
FMCT 341	3	HUEC 464	3
FMCT 381	3	HUEC 487	3
FMCT 441	<u>3</u>	HUEC 490	<u>3</u>
	16		18

Total Credit Hours: 137

¹EXSC 111 cannot be repeated for credit.

²Student must select a 300 or 400 Level BUAD course.

³AC 231 is equivalent to ENGL 305.

⁴AC 221 is formerly known as AC 121.

⁵AC 362 is formerly known as AC 261

⁶FM 114 is equivalent to FMCT 141.

⁷Students may substitute IC 291/491 for HUEC 399 and 400 for 4 credits.

NUTRITION PROGRAM

The program in Nutrition provides a strong foundation in basic sciences, including chemistry, biochemistry, physiology and microbiology. Nutrition requires an in-depth knowledge of the physiological and biochemical aspects of metabolism, the nutrient composition of foods and an appreciation of the role of social and economic factors as determinants of food selection.

The program allows students to select certain courses in accordance with their interests. Teaching and research efforts are focused on the basic sciences of nutrition and foods and the application of knowledge in these disciplines to the maintenance of health and well being of human beings throughout the lifespan. It also meets the needs of students who want to continue with their graduate work; and it provides students with a strong foundation for graduate studies in human nutrition and related fields, such as public health. The School of Agricultural and Natural Sciences also offers a Master of Science degree in Food and Agricultural Sciences.

DEPARTMENTAL REQUIREMENTSThe Nutrition Program require that all students maintain a “C” in each course in their Program Core and Program Electives and a “C” average in General Education and Supportive Course Requirements. Individual programs may choose specific courses to fulfill General Education requirements. Students transferring into the department from another department or institution must have a 2.5 Cum GPA. All students are required to complete a 200 clock-hour internship.

Nutrition students are not required to complete an internship. However, each student is required to complete an extensive senior research project. The topic of the senior project is based on the student’s area of interest. Recent topics of interest include food safety, nutrition and aging, nutrition and sports, and directed experimental research.

Students must include a minimum of 12 credits of Out-of-Class Experience. Students should consult their advisor when selecting the Out-of-Class Experience courses.

CAREER OPPORTUNITIES

Potential employment opportunities include research positions in laboratories, hospitals and industry. This program meets the needs of students who want to continue with their graduate work; it provides students a strong foundation for graduate studies in human nutrition and related fields, such as public health.

REQUIRED MAJOR COURSES

NUDT 210	NUDT 305	NUDT 473	HUEC 370
NUDT 211	NUDT310	NUDT Elective	HUEC 399
NUDT 212	NUDT 391		HUEC 400 ¹
	NUDT 392		HUEC 409
			HUEC 464

¹Students may substitute NUDT 484 for HUEC 400 for five (5) credits.

CURRICULUM GUIDE FOR NUTRITION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 111	3	BIOL 111	3
CHEM 113	1	BIOL 113	1
ENGL 101	3	CHEM 112	3
HUEC 100	1	CHEM 114	1
MATH 109	3	EXSC 111 ¹	3
SOCI 101	<u>3</u>	ENGL 102	3
	14	ENGL 001	0
		GEN ED CURR AREA I	<u>3</u>
			17

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 231	3	BIOL 232	3
BIOL 233	1	BIOL 234	1
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
ENGL 203	3	NUDT 210	3
NUDT 211	3	NUDT 212	3
GEN ED CURR AREA I	<u>3</u>	NUDT 305	<u>3</u>
	18		17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 341	3	CHEM 342	3
CHEM 343	1	CHEM 344	1
HUEC 370	2	ENGL 305	3
NUDT 310	3	MATH 210	3
NUDT 391	3	NUDT 392	<u>3</u>
PSYC 200	<u>3</u>		13
	15		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AMIC 324 or	4	NUDT 473	3
BIOL 301 and	3	NUDT 484 ^{2,3}	5
BIOL 303	1	Elective	3
Elective	4	HUEC 464	<u>3</u>
HUEC 474	2		14
NUDT Elective	<u>3</u>		
	13		

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.

²Students may substitute NUDT 484 for HUEC 399, 400 & 409 for five (5) credits.

³NUDT 484 (5 credits) and NUDT 499 (1-3 credits) meet the Out-of-Class Experience. Students should consult their advisor to select appropriate courses to meet the 12 credit hour requirement.

MINOR PROGRAMS

The Department offers minor programs in Clothing and Textiles, Fashion Merchandising, Gerontology, Nutrition, and Family Financial Planning. The minor program in Nutrition has two Options: Nutritional Science and Food and Nutrition. A minimum of 18 credits is required for each area. Fashion Merchandising and Family & Consumer Science majors should consult advisor prior to selecting a minor. Clothing and Textiles, Gerontology, and Nutrition Option 2 are not available to FCS majors because of course duplication. The courses are as follows.

CLOTHING AND TEXTILES

FMCT 300	FMCT 361	FMCT 381
		FMCT 382

Select Two from:

FMCT 321	FMCT 422	HUEC 490
	FMCT 460	

FASHION MERCHANDISING

FMCT 141	FMCT 341	FMCT 441
	FMCT 342	

Select two from:

FMCT 361	FMCT 381	HUEC 487
	FMCT 390	HUEC 490

GERONTOLOGY

HUEC 220	HUEC 460	SOCI 361
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Select three from:

HUEC 203 ¹	NUDT 305	REHA 201
HUEC 450		REHA 302

NUTRITION OPTION 1: NUTRITIONAL SCIENCE

NUDT 210 ²	NUDT 391	NUDT 401
	NUDT 392	NUDT 402
		NUDT 473

NUTRITION Option 2: Food and Nutrition

NUDT 210	NUDT 305	NUDT 473
NUDT 211	NUDT 310	
NUDT 212		

FAMILY FINANCIAL PLANNING

HUEC 301Online	HUEC 403Online	HUEC 408 Online
HUEC 305 Online	HUEC 404Online	
HUEC 315 Online		

All students who enroll in degree programs will be required to complete 12 alternative credits before graduating. Alternative credits can be earned by completing internships, summer and winter session courses, on-line courses/undergraduate research, and courses completed while studying abroad.

¹ENGL 203 cannot be used to satisfy the General Education Requirement.

²FCS students may substitute NUDT 214.

COURSE DESCRIPTIONS IN CHILD DEVELOPMENT

- CHDE 220 Foundations of Early Childhood Credit 3**
This course provides a conceptual framework for examining roles and services in early childhood education, and includes historical, social, and philosophical influences while emphasizing current trends, issues, and practices. Attention is given to family and professional partnerships. The course introduces basic techniques for observing children. A field experience is required. Prerequisite: PSYC 200.
- CHDE 222 Infant/Child Development and Learning Credit 3**
This course is the study of how children develop and learn from conception to middle childhood. Theory and research relating to the physical, social-personal, and cognitive development of children and the role of family are emphasized. Field experience required. Prerequisite: PSYC 200.
- CHDE 224 Emerging Language & Literacy Credit 3**
This course examines the theories, processes, and acquisition of language arts, and addresses the cognitive, linguistic, social and physiological factors involved in oral and written language development. Prerequisite: CHDE 222.
- CHDE 323 Creative Activities for Young Children Credit 3**
This course is designed to provide many opportunities to gain techniques and resources for art, music, play, and creative dramatics. The students will identify resources and age appropriate activities to develop skills for organizing and presenting creative activities to young children. This course has two-hour lectures and one two-hour laboratory. Prerequisites: CHDE 220, CHDE 222. OPEN TO MAJORS ONLY.
- CHDE 325 Special Needs in Early Childhood Credit 3**
This course provides a framework for using principles of developmentally appropriate practice to design effective learning programs for young children with special needs. The focus includes children from birth to age 8 and their families who are in a variety of early childhood settings. **Emphasis will be placed on inclusion.** Prerequisites: CHDE 220, CHDE 222. OPEN TO MAJORS ONLY.
- CHDE 327 Curriculum and Instruction for Infants and Toddlers Credit 3**
This course provides application of theoretical and empirical research for field observations and curriculum projects. Emphasis is on integration of curricula responsive to individual needs in multidisciplinary and inclusive settings, along with the study of parent-child relations and early socialization with significant others and peers in program environments through activities which foster all areas of development. Prerequisites: CHDE 220, CHDE 222. OPEN TO MAJORS ONLY.
- CHDE 330 Observing and Interpreting Behavior of Young Children/Online Credit 3**
Approaches will be provided for observing, recording and interpreting the behaviors of children who are developing normally and those with special needs in a variety of early childhood education settings. A child observational study is required. This class has two hours lecture and one two-hour laboratory. Prerequisites: CHDE 220, CHDE 222. OPEN TO MAJORS ONLY.
- CHDE 332 Curriculum and Instruction for Preschool Children Credit 3**
This course examines curricula development and implementation of instructional strategies for preschool children in a variety of settings, including nursery schools, childcare and home-care centers, Headstart, hospitals, and community programs. A field experience is required. Prerequisite: CHDE 327. OPEN TO MAJORS ONLY.
- CHDE 427 Partnerships/Online Credit 3**
The aim of this course is to examine the role of the teacher and parent in the school setting with the goals of maximizing the child's education and developing insights into students' growth. Development of strategies for parent-teacher collaboration that support growth of the child's learning potential in home and school environments are emphasized. Prerequisites: CHDE 330, CHDE 332. Senior Standing. OPEN TO MAJORS ONLY.
- CHDE 430 Supervision and Administration of Early Childhood Programs Credit 3**
This course examines the role and function of an early childhood program administrator. Instructional focus includes planning, budgeting, financing, staffing and the facilitation of parent involvement within childhood programs. Students assess educational and professional information needs in terms of the system services available. Materials and experiences in this course are appropriate for the early childhood education student as well as the practicing director. Prerequisites: CHDE 330, CHDE 332, Senior Standing, or Permission of Instructor. OPEN TO MAJORS ONLY.

CHDE 440 School Age Programming Credit 3
This course will have students examining appropriate principles, materials and methods used with school age children. Emphasis is placed on growth and development of children 5 to 12 years of age. Development and implementation of age appropriate activities is considered as well as classroom management, environmental planning, utilization of community resources, and communication with parents. Prerequisites: CHDE 222. OPEN TO MAJORS ONLY.

CHDE 499 Independent Study/Research in Child Development Credit 1-3
This course provides an intensive study of a specialized topic in Child Development for advanced students. Permission to take an independent study must be obtained from the instructor. OPEN TO MAJORS ONLY.

FASHION MERCHANDISING CLOTHING AND TEXTILES

FMCT 141 Introduction to the Fashion Industry Credit 3
Introduction to the Fashion Industry provides an overview of the fashion industry, including the organization and operation of the numerous facets of the textile, apparel, home furnishings, and cosmetics industries, product development, the impact of technology, and career opportunities. Forty clock hours of work experience in a retail or related setting is also required. This course consists of three hours of lecture.

FMCT 201 Clothing and Textiles for Consumers¹ Credit 3
This course focuses on the basic knowledge of fabric characteristics and its application in the selection of products for apparel and home furnishings. The study of social, cultural, economic, and psychological factors that influence choices related to textile products are discussed.

FMCT 300 Historic Costumes/Online Credit 3
This course is the study of historic costumes and design reflecting the social, economic, and political environment of the past and fashion cycles relating historic costume/designs to current fashions. The course consists of three hours of combined lecture and laboratory.

FMCT 321 Fashion Illustration Credit 3
Fashion Illustration provides an introduction to drawing fashion figures, rendering various textiles, and illustrating apparel and accessories utilizing an array of media. The course consists of three hours of combined lecture and laboratory.

FMCT 341 Fashion Buying & Merchandising/Honors Credit 3
This course provides practical application of buying practices and procedures; merchandise planning, controlling, budgeting; merchandise assortment planning; and managing inventory. Prerequisites: FMCT 141, MATH 109 or higher. Co-requisite: MKTG 308. OPEN TO MAJORS AND MINORS ONLY.

FMCT 342 Advertising and Promotion/Honors Credit 3
Advertising & Promotion introduces students to both the theoretical and practical aspects of the principles and techniques used in promoting fashion goods and services to the consumer. Promotional strategies and creative concepts for promotional campaigns are developed by the students for local businesses. The course consists of three hours of combined lecture and laboratory. Prerequisites: FMCT 141. Junior Standing. OPEN TO MAJORS AND MINORS ONLY.

FMCT 361 Apparel Construction/Evaluation Credit 3
The main focus of this course is to provide an introduction to various sewing techniques, and to demonstrate the use of commercial patterns. A variety of garment components, including alterations, is identified and classified. An evaluation of ready-to-wear apparel will be fully conducted. One lecture and two laboratories. OPEN TO MAJORS AND MINORS ONLY.

FMCT 381 Textiles I Credit 3
This is a fundamental course that covers information on fibers, yarns, fabric construction, dyeing, printing and finishing of textiles. Two lectures and one laboratory. OPEN TO MAJORS AND MINORS ONLY.

¹Course cannot be completed by Fashion Merchandising majors.

- FMCT 382 Textiles II/Honors Credit 3**
 This course requires an understanding of basic textiles principles. Students enrolled in this course are required to measure the physical properties of fabrics, compile and analyze data, and relate the results to the performance of fabrics and garments. One lecture and two laboratories. Prerequisite: MATH 109, FMCT 381. OPEN TO MAJORS AND MINORS ONLY.
- FMCT 390 Product Development Credit 3**
 Product Development introduces both theoretical and practical aspects of the principles and techniques used in the creation, production, marketing, and distribution of fashion-related products that meet customer needs in the microeconomic and/or global marketplace. Actual prototypes will be created. The course consists of three hours of combined lecture and laboratory. Prerequisites: BUED 212, MKTG 308, or instructor's permission.
- FMCT 422 Apparel Design: Pattern Drafting and Draping Credit 3**
 Apparel Design: Pattern Drafting and draping introduces students to basic principles of flat pattern design and draping through the development of the master pattern and its use in the design and production of marketable apparel. The course consists of one hour of lecture and two hours of laboratory. Prerequisite: FMCT 361.
- FMCT 441 Visual Merchandising Credit 3**
 Visual Merchandising is the study of principles and practices of designing and evaluating the various aspects of visual displays. The course involves the creation of window and interior promotional displays and the development of a visual portfolio. The course consists of three hours of combined lecture and laboratory. Prerequisite: FMCT 342. OPEN TO MAJORS AND MINORS ONLY.
- FMCT 460 Clothing for Special Needs Credit 3**
 This course has main emphasis on clothing selection, basic fitting, and sewing techniques to meet needs related to age, figure type, and physical disability. Two lectures and one laboratory. Prerequisite: FMCT 361.
- FMCT 463 Tailoring/Alterations Credit 3**
 This course is designed to teach the fundamentals of tailoring and alterations. Tailoring techniques include short-cut tailoring methods, as well as samples of custom tailoring techniques. Students learn to apply alteration techniques for various fitting problems. One lecture and two laboratories. OPEN TO MAJORS ONLY. Prerequisite: FMCT 361.
- FMCT 497A Fashion Merchandising Study Tour Credit 1-3**
 Fashion Merchandising Study Tour is an organized trip to a designated city or country that allows student to explore the various facets of the fashion industry through visits to manufacturing facilities, designer showrooms, pattern companies, advertising agencies, retailers, colleges, forecasters, publishers, and museums. OPEN TO MAJORS ONLY.
- FMCT 497B Textiles Study Tour Credit 1-3**
 Textiles Study Tour is an organized trip to a designated city or country that allows student to explore the various facets of the textile manufacturers, converters, testing laboratories, and museums. OPEN TO MAJORS ONLY.
- FMCT 499 Independent Study/Research in Fashion/Clothing Credits 1-3**
 Independent Study/Research in Fashion allows the student to participate in an intensive study of a specialized topic or existing research project related to fashion or clothing. Permission to take an independent study must be obtained from the instructor. OPEN TO MAJORS AND MINORS ONLY.

HUMAN ECOLOGY

- HUEC 100 First Year Experience Seminar Credit 1**
 This course provides an opportunity for students to make a seamless transition from high school to college. Essential skills for transition will be explored and discussed. This course assists students in developing cognitive skills and in adjusting personally and socially to the college environment. Additionally this course facilitates self-awareness and interpersonal communication. Requirement for all first year students. This course is taken by HUMAN ECOLOGY MAJORS in lieu of GNST 101. One lecture.
- HUEC 101 Principles of Art and Design/Lab Credit 3**
 Principles of Art and Design/Lab is designed to introduce students to the basic principles and elements of art and design through a variety of studio projects. The course consists of two lecture hours and one laboratory hour. OPEN TO MAJORS AND MINORS ONLY.

- HUEC 203 Human Development: A Lifespan Perspective/Online Credit 3**
This course is a study of human development from conception to death. It examines the interactions within the family system from a lifespan perspective. MAY NOT RECEIVE CREDIT FOR PSYC 305. Satisfies Gen. Ed. Requirement Area II.
- HUEC 220 Perspectives on Aging Credit 3**
This is an interdisciplinary course that examines the phenomenon of aging and its consequences for society from a variety of perspectives. The course is designed to give students a broad overview of the field of gerontology. Satisfies GEN ED CURR AREA II.
- HUEC 230/W Multicultural Perspectives on Families in the U.S. Credit 3**
This course is an interdisciplinary introduction to the concepts central to multiculturalism and diversity as they apply to the study of contemporary families in the U.S. Satisfies GEN ED CURR AREA VI.
- HUEC 243 Housing Design Credit 3**
This course is a study of the interaction of people and the built environment. It examines ergonomics, anthropometrics, and proxemics in human factors and lifespan issues as they relate to the design of interiors. Prerequisites: PSYC 200, SOCI 101.
- HUEC 310 Resource Management/Honors Credit 3**
This course focuses on the allocation and management of resources, personal and family financial decision making, and wise selection and purchase of consumer goods and services. Prerequisites: MATH 102 or MATH 109, SOCI 101, PSYC 200. OPEN TO MAJORS AND MINORS ONLY.
- HUEC 343 Dwelling Credit 3**
This course is an examination of contemporary housing issues within the context of the socio-economic, political, and psychological factors that impact the process of housing. Major theories and policies will be discussed.
- HUEC 361 Contemporary Family Issues Credit 3**
This course is a study of contemporary issues affecting the family system, such as parenting, divorce, death, drug dependence, non-traditional life styles, mobility, and chronic illness. Prerequisites: SOCI 101, PSYC 200. Satisfies GEN ED AREA II. OPEN TO MAJORS AND MINORS ONLY.
- HUEC 370 Professional Development/Online Credit 2**
This course is designed to prepare students for a professional career in various divisions of Human Ecology. Emphasis is placed on resume writing, interviewing skills, dressing for success, developing a professional image, presentational and oral communication skills, and planning and organizing presentations before small and large audiences. OPEN TO MAJORS ONLY.
- HUEC 399 Pre-Internship Seminar/Online Credit 1**
Pre-internship Seminar is designed to prepare students for internships in the field of family and consumer sciences/human ecology. This course consists of one lecture hour. Prerequisite: Junior Level Standing. OPEN TO MAJORS ONLY.
- HUEC 400 Internship Credit 3-5**
Internship is a supervised work experience in an approved work setting planned cooperatively with business establishments, agencies, or centers. Fashion and family and consumer science students take this course during the summer preceding the senior year for three credits. Child development students register for **five** credits during their final semester and register concurrently with HUEC 409 and HUEC 450. Two hundred clock hours of field experience are required. Prerequisite: HUEC 399. OPEN TO MAJORS ONLY.
- HUEC 409 Post-Internship Seminar Credit 1**
Post-Internship Seminar provides the opportunity for students to reflect upon and present an overview of their work experience in their discipline. The course is one hour. Prerequisites: Senior Level Standing, HUEC 400, or permission of the instructor. OPEN TO MAJORS ONLY.
- HUEC 450 Practicum-Human Development Credit 1-5**
This course is a concentrated, continuous, on the job experience in various aspects of human services under the supervision and guidance of trained personnel. Students with a Child Development concentration will observe and participate with groups of young children in Day Care/Headstart Centers or with older children in shelters and youth programs. Students taking this course for a minor in gerontology will be assigned to an agency/organization or institution that serves the elderly. Students have to have 40 clock hours for each credit hour. OPEN TO MAJORS AND MINORS ONLY.

- HUEC 460 The Family and Aging Credit 3**
 This course examines the aging process and its impact on the family and explores the characteristics, attitudes, behaviors, and concerns of older people, including their physical, psychological, social, and economic needs. Related legislative and community resources are also examined.
- HUEC 464 Social Psychology of Food, Clothing and Shelter Credit 3**
 This course includes interdisciplinary examination of the socio-psychological and economic dimensions of choices related to food, clothing, and shelter in multicultural family and community environments. OPEN TO MAJORS AND MINORS ONLY.
- HUEC 474 Research Methodology/Honors Credit 2**
 This course covers an overview of research methods commonly used in human ecology related disciplines. Upon completion of the course, the students should be able to read and critique studies. They should also be able to design and conduct experiments related to their field of study. Students should also be able to design and carry out their own research studies. Prerequisite: Senior Level Status. OPEN TO MAJORS ONLY.
- HUEC 487 Supervisory Management/Honors Credit 3**
 This course is the study of principles and applications of managerial skills required for first-line supervisors. Emphasis is on supervisory functions, decision-making, delegation, motivation is leadership styles, communication, and conflict-resolution. Open to all students. Prerequisite: Senior Standing. OPEN TO MAJORS AND MINORS ONLY.
- HUEC 490 Consumer Motivation/Honors Credit 3**
 This course offers an interdisciplinary approach to the study of consumer motivation and behavior in the marketplace with emphasis on functioning of the market system and models of consumer behavior. Prerequisites: SOCI 101, PSYC 200. OPEN TO MAJORS AND MINORS ONLY.
- HUEC 499 Independent Study/Undergraduate Research Credit 1-3**
 Students who wish to get advanced experience in a particular area of their discipline and an opportunity to do supervised, individualized studies may enroll in this course. The maximum number of undergraduate special topics or independent study credits that may be taken with the same prefix and number is determined by the student's major department. Department chair's approval is required. OPEN TO MAJORS ONLY.

NUTRITION, DIETETICS

- NUDT 210 Elements of Nutrition Credit 3**
 This is an introductory level nutrition course, which covers the fundamental concepts, nutrient functions, and human nutritional requirements.
- NUDT 211 Scientific Principles of Food I Credit 3**
 This is a fundamental course in food preparation based on physical, chemical, and nutritional changes occurring in food. Government regulations governing food and food safety are also covered. Product evaluation using sensory techniques is emphasized. One lecture and two laboratories. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 212 Scientific Principles of Food II Credit 3**
 This is a continuation of NUDT 211. Students are required to carry out individual and group projects to further their understand of the principles covered. Prerequisite: NUDT 211. One lecture and two laboratories. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 214 Infant and Child Nutrition Credit 3**
 The course is the study of nutrition from conception through adolescence, including factors affecting nutrient requirements, food choices, and nutritional problems. Special emphasis is placed on managing feeding problems and the relationship between nutrition, and physical and mental development.
- NUDT 300 Essentials of Nutrition Practice Credit 1**
 This course introduces the student to nutrition/dietetics practice. It includes a review of the history of the profession as well as the educational and experiential requirements for the nutrition practice. Course content includes legislation, standards, and regulations affecting practice; professional and bioethics; career opportunities; and factors which affect the delivery of nutrition services. The course is open to junior or senior level nutrition/dietetics majors.

- NUDT 305 Nutrition in the Life Cycle Credit 3**
 This course will provide students with an understanding of the nutritional requirements and related health concerns occurring throughout the life cycle. Course covers relevant topics including growth and development, nutrient needs, assessment of nutritional status and special problems associated with stages of the life cycle starting from conception through adulthood and aging. Prerequisite: NUDT 210, or permission of the instructor. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 310 Nutrition Education and Counseling Credit 3**
 This course includes a study of nutrition education and counseling principles and techniques; students explore counseling strategies used to assess and modify nutrition behaviors. Prerequisite: PSYC 200. This course is cross-listed with NUDT 499F. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 391 Nutritional Science I Credit 3**
 This course examines the biochemical and physical bases of human nutritional requirements. It covers the digestion and metabolism of carbohydrates, proteins, fats, minerals and vitamins. Prerequisites: CHEM 211+213 and 212+214. This course is cross-listed with NUDT 499C. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 392 Nutritional Science II Credit 3**
 This course is a continuation of NUDT 391. Survey of current literature and research in nutrition is also included. Prerequisites: NUDT 391 and CHEM 341+343. This course is cross-listed with NUDT 499A. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 401 Clinical Nutrition I Credit 3**
 This course involves the application of nutritional concepts to the treatment of disease states. Concepts and/or skills acquired include nutrition screening/assessment, food/drug/herbal interaction, and principles of nutrition care management including nutrition support. Prerequisite: NUDT 392. This course is cross-listed with NUDT 499. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 402 Clinical Nutrition II Credit 3**
 This course is a continuation of NUDT 401; concepts and skills acquired in NUDT 401 are expanded to include nutrition management of diseases affecting organ systems and in-born errors of metabolism. Prerequisite: NUDT 401. This course is cross-listed with NUDT 499D. OPEN TO MAJORS AND MINORS ONLY.
- NUDT 471 Foodservice Systems Management Credit 5**
 This course focuses on foodservice systems organization and management. Students explore concepts and applications of food safety principles, menu planning, purchasing, production, service, and resource management. Content also includes marketing strategies and use of computer technology in foodservice operations. Course combines didactic and laboratory offerings. Open to Juniors and Seniors. Prerequisites: NUDT 211 and NUDT 212. This course is cross-listed with NUDT 499H.
- NUDT 473 Community Nutrition Credit 3**
 This course involves a study of planning, implementation and evaluation of nutrition programs. Strategies and resources for community needs assessment, health promotion and disease prevention; programming and funding are also included. Prerequisites: NUDT 310 or permission of the instructor. This course is cross-listed with NUDT 499E.
- NUDT 475 Senior Practicum Credit 4**
 This course involves experiential learning designed to allow students to observe and practice the role of a nutrition practitioner in a health care setting. Students will have experiences in community, clinical and food service domains. Prerequisite: NUDT 471. Senior level status. OPEN TO MAJORS ONLY. This course is cross-listed with NUDT 499B.
- NUDT 484 Nutrition Research Credit 3-5**
 This course requires students to understand the principles of basic experimental design and plan and carry out a specific project in their area of interest. Prerequisites: Senior level status and permission of the instructor. This course is cross-listed with 499G.
- NUDT 485 International Nutrition Credit 3**
 This course will explore international aspects of nutrition, including global nutrition concerns, world hunger and malnutrition. Local, national, and international programs involved in program planning and improvement will be investigated.

NUDT 499 Independent Study/Undergraduate Research Credit 1-5
 This course is designed for nutrition and dietetics majors wishing to explore topics of special interest through an independent study. Students must obtain prior approval of the independent project from the course instructor, and permission of the department chair. This course is limited to nutrition and dietetics majors only.

NUDT 499A	Nutritional Science II	Credit 3
NUDT 499B	Senior Practicum	Credit 4
NUDT 499C	Nutritional Science I	Credit 3
NUDT 499D	Clinical Nutritional II	Credit 3
NUDT499E	Community Nutrition	Credit 3
NUDT 499F	Nutrition Education & Counseling	Credit 3
NUDT499G	Nutrition Research	Credit 3-5
NUDT499H	Food Service System Management	Credit 5
NUDT499I	Independent Research	Credit 1-5

DIRECTORY OF FACULTY

Cecil, Malinda **Lecturer**
B.S., Hood College; M.S., Virginia Tech

Clinton, Bridgett **Lecturer**
B.S., University of Maryland Eastern Shore; M.S., Michigan State University

Hinnant-Bernard, Thessalenuere **Visiting Associate Professor**
B.A. and M.S., North Carolina Central University; Ph.D., Iowa State University

Lombuso Khoza **Assistant Professor**
B.S., University of Maryland Eastern Shore; M.S., University of California, Davis; M.S., University of Leeds; Ph.D., Southern Illinois University Carbondale

Kumelachew, Missale **Associate Professor**
B.S., University of Minnesota; M.S., Howard University; Ph.D., University of Maryland College Park

Long, Donna **Assistant Professor**
B.A., Hood College; M.A., Trevecca Nazarene University; Ed.D., Wilmington College

Lyon-Bennett, Nina **Acting Chair and Associate Professor**
B.A., Clark College; M.S., Atlanta University; Ph.D., University of Georgia

Satterlee, Donna **Lecturer**
B.S., Beaver College; M.Ed., Old Dominion University

Shaw, Anugrah **Professor**
B.S., Delhi University; M.S., Maharaja Sayajirao University; Ph.D., Texas Woman's University

DEPARTMENT OF NATURAL SCIENCES

<http://www.umes.edu/SANS>

Dr. Joseph M. Okoh, Chairperson

MISSION

The mission of the Department of Natural Sciences (DNS) is to prepare students for employment in the diversified fields in biological, physical and environmental sciences and health related occupations. Our programs also prepare students for entry into graduate or professional schools.

DNS offers programs for students majoring in Biology, Chemistry, and Environmental Science and minors in Biology, Chemistry and Physics. The Chemistry Program is certified by the American Chemical Society. Also offered are teaching programs in Biology and Chemistry.

Included in the Department's offerings is a two year pre-Pharmacy program and minors in Biology, Chemistry, Environmental Science and Physics. In cooperation with the University of Maryland Center for Environmental and Estuarine Studies (CEES), combined four-year B.S./ five-year M.S. programs in Marine Sciences and Environmental Chemistry are available.

The Department offers courses leading to M.S. and Ph.D. degrees in Toxicology and the University-wide graduate program in Marine-Estuarine-Environmental Sciences.

The Department also provides courses which satisfy the general education requirements in the biological and physical sciences and supporting courses for students in other departments.

OBJECTIVES

The objectives of the programs in DNS are to:

1. Provide students with academic curricula to develop a strong understanding of basic science.
2. Prepare students to be adaptable to new developments in science.
3. Train students to conduct scientific research through example, mentoring and personal experience.
4. Prepare students for employment in newly evolving and conventional scientific fields related to their majors.
5. Expose students to social, historical, and ethical issues through the science curricula.
6. Promote interaction between the university and the community through faculty and students in the department.
7. Promote faculty development to accomplish the objectives of the department.

DEGREES OFFERED

Bachelor of Science – Biology Non-Teaching

Bachelor of Science – Biology Honors Non-Teaching, with Pre-Physical Therapy and Pre-Medicine Options

Bachelor of Science – Biology Education – Teaching

Bachelor of Science – Chemistry Non-Teaching (ACS*Certification)

Bachelor of Science – Chemistry Honors Non-Teaching (ACS*Certification), with Pre-Dentistry and Pre-Medicine Options

Bachelor of Science – Chemistry Non-Teaching

Bachelor of Science – Chemistry Education –Teaching

Bachelor of Science – Environmental Sciences

Bachelor of Science – Environmental Sciences Honors

Dual Degree

Bachelor of Science/Master of Science¹ (BS/MS) – Environmental Sciences

Bachelor of Science/Master of Science¹ (BS/MS) – Environmental Sciences Honors

PRE-PROFESSIONAL PROGRAMS OFFERED

Pre-Medicine

Pre-Pharmacy

DEPARTMENT GENERAL PROGRAM REQUIREMENTS

Maryland Higher Education Commission has set a graduation requirement of 120 semester hours to obtain a four year baccalaureate degree. The Biology, Chemistry and Environmental Science Programs require that majors earn a minimum grade of “C” in each course of the Program Core Courses and Program Electives and an overall “C” grade average in General Education and Supportive Course Requirements.

DEPARTMENTAL REQUIREMENTS

Biology Non-Teaching major: Students majoring in Biology non – Teaching must complete a total of 120¹ credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 31 semester hours of Supportive courses and 2 semester hours of free electives.

Biology Non-Teaching Honors: Students majoring in Biology non – Teaching Honors must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 32 semester hours of Supportive courses and 2 semester hours of free electives. The admission of students to the undergraduate program in Biology is based upon the general admission requirements of the University. Minimum requirements for application to the UMES Honors Program include a cumulative grade point average of 3.3 and minimum SAT score of 1650. Additionally, for retention in the Honors Program, each student must maintain a semester grade point average of 3.0 in their major courses and a cumulative GPA of 3.3. Students must complete a minimum of two honors courses each semester.

Biology Non-Teaching - Pre-Med/Pre-Dentistry Tracks: Students majoring in Biology with Pre-Med/Pre-Dentistry Tracks must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 19 semester hours of program electives and 34 semester hours of Supportive courses .

Biology Non-Teaching - Pre-Physical Therapy Track: Students majoring in Biology Non-Teaching with pre-Physical Therapy Track must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 31 semester hours of Supportive courses and 2 semester hours of free electives.

Biology Teaching: Students in the major must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 17 semester hours of Departmental Core courses, 3 semester hours of program electives, 42 semester hours of professional Education courses, and 16 semester hours of Supportive courses.

Students who meet University of Maryland Eastern Shore’s admission requirements can enroll in Biology Education. Prospective Biology Teacher Education candidates are not formally admitted to the Professional Education Unit until they have completed an Application to Teacher Education and have been accepted.

¹Please consult the UMES Graduate Catalog for clarification of the Dual Degree MS requirements.

²Minimum Maryland Higher Education Committee (MHEC) requirements for a bachelor of science degree.

Teacher candidates who wish to major in Biology Education must have an overall and major content grade point average of 2.75 for admission into and retention in the program. For admission, overall GPA of 2.75 or higher in a minimum of 45 approved semester hours is required, passing the University's English Proficiency Seminar, and also PRAXIS I (scheduled and administered by Educational Testing Services) while registered for Praxis preparation course (Credit 1) EDCI 201.

	Passing Praxis Scores	
	Paper/Pencil Test	Computer-Based Test
Reading	177	325
Mathematics	177	322
Writing	173	319

Applications must be completed for admission to the Biology Education teacher program within the scheduled deadline. The teacher education application lists specific course requirements and requires two essays which address potential candidate's disposition toward teaching, as well as providing writing samples, and field experience recommendation. Four letters of recommendation from faculty (one has to be from the advisor) are also required.

Grades of "C" or above must be attained in each required course of the Biology Education major, the specialized content area combined with the professional educational courses. A candidate's progress is monitored each semester by the academic advisor to ensure that the candidate continues to meet the minimum GPA of 2.75 in both the major and overall course work.

In order to be eligible for internship, Biology Education candidates are required to submit the following indicators: application for internship, field experience, and pre-internship recommendations, methods instructor recommendations, formal academic measures including a 2.75 or higher overall grade point average, a 2.75 grade point average in the major, with no grades lower than C in all courses, PRAXIS II passing scores in Biology, and working portfolio review.

All Biology Education candidates must satisfactorily complete the independent research project and manuscript prior to graduation. The candidates must satisfactorily complete the professional portfolio, which is started early in the program and revised and completed during the internship experience, is tied to the INTASC Principles, Unit's Conceptual Framework, and NSTA standards prior to graduation. They must also complete an Exit Survey.

Chemistry non -Teaching with ACS Certification*: To obtain an ACS-certified chemistry degree, students must complete a total of 120 credit hours of University courses. This includes a minimum of 52 semester hours of program core courses, 15-16 hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses, and 2 hours of free electives courses from the approved lists of requirements as outlined in the catalog. The students must also follow ACS guidelines for CHEM 499 (undergraduate research). This includes research project conducted at UMES and comprehensive research report. The report should be written to meet the ACS requirement as outlined in the ACS document "Guidelines for Preparing a Research Report." For more information, please refer to the ACS website www.ACS.org.

Chemistry Non -Teaching with ACS Certification* with Pre-Medicine/Pre-Dentistry tracks: students must complete a total of 120 credit hours of University courses to obtain an ACS-certified chemistry degree. This includes 48-49 semester hours of program core courses, 18-19 hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses, and 3 hours of free electives courses from the approved lists of requirements as outlined in the catalog. The students must also follow ACS guidelines for CHEM 499 (undergraduate research). This includes a research project conducted at UMES and a comprehensive research report. The report should be written to meet the ACS requirement as outlined in the ACS document "Guidelines for Preparing a Research Report." From more information, please refer to the ACS website, www.ACS.org.

Chemistry non -Teaching without ACS Certification: Students must complete a minimum of 120 credit hours which include 52 semester hours of program core courses, 15 (16) hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses and 2 hours of free electives courses from the approved lists of requirements as outlined in the catalog. Students are not required to follow the ACS course guidelines since the degree is non-ACS certified.

Chemistry Teaching: Maryland Higher Education Commission has set a graduation requirement of 120 semester hours to obtain a 4 year baccalaureate degree. Students must complete 52 semester hours of program core courses, 15 (16) hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses and 2 hours of free electives courses from the approved lists of requirements as outlined in the catalog. Students are not required to follow the ACS course guidelines since the degree is non-ACS certified. Teacher candidates who wish to major in Chemistry Education must have an overall and major content grade point average of 2.75 for admission into and retention in the program. For admission, overall GPA of 2.75 or higher in a minimum of 45 approved semester hours, passing the University's English Proficiency Seminar, and PRAXIS I (scheduled and administered by Educational Testing Services) while registered for Praxis preparation course (Credit 1) EDCI 201 are required.

Any individual who meets University of Maryland Eastern Shore's admission requirements can enroll in chemistry Education. Prospective Chemistry Teacher Education candidates are not formally admitted to the Professional Education Unit until they have completed an Application to Teacher Education and have been accepted.

Teacher candidates who wish to major in Chemistry Education must have an overall and major content grade point average of 2.75 for admission into and retention in the program. For admission, overall GPA of 2.75 or higher in a minimum of 45 approved semester hours is required, passing the University's English Proficiency Seminar, and also PRAXIS I (scheduled and administered by Educational Testing Services) while registered for Praxis preparation course (Credit 1) EDCI 201.

Passing Praxis Scores

Paper/Pencil Test		Computer-Based Test
Reading	177	325
Mathematics	177	322
Writing	173	319

In order to be eligible for internship, Chemistry Education candidates are required to submit the following indicators: application for internship, field experience, and pre-internship recommendations, methods instructor recommendations, formal academic measures including a 2.75 or higher overall grade point average, a 2.75 grade point average in the major, with no grades lower than C in all courses, PRAXIS II passing scores in Chemistry, and working portfolio review.

All Chemistry Education candidates must satisfactorily complete the independent research project and manuscript prior to graduation. The candidates must satisfactorily complete the professional portfolio, which is started early in the program and revised and completed during the internship experience, is tied to the INTASC Principles, Unit's Conceptual Framework, and NSTA standards prior to graduation. They must also complete an Exit Survey.

Environmental Science - Environmental Chemistry Option: Students must complete 120 semester hours: 42 semester hours in general education courses, 29 semester of hours in program core courses, 46 semester hours in program supportive courses and 3 semester hours in program electives. Students are required, to take independent study and/or undergraduate research in their junior or senior year.

Environmental Science - Marine Science Option: Students must complete 120 semester hours: 42 semester hours in general education courses, 38 semester hours in program core courses, 34 semester hours in program supportive courses and 6 semester hours in electives. Students are required, to take an independent study or undergraduate research in their junior or senior year.

Dual Degree Program - Environmental Science (Marine Sciences Track) UMES - SU Dual Degree Program-Students enrolled at Salisbury University in the Biology Program may earn a degree in Environmental Sciences from UMES by taking 30 hours of prescribed coursework in Environmental Science at UMES in addition to other required courses at Salisbury University.

Combined Four-year/Five-year B.S./M.S. Degree Program with Environmental Chemistry and Marine Sciences options: The two options are administered under the auspices of the undergraduate Environmental Science and the graduate Marine-Estuarine-Environmental Science (MEES) programs. The student receives the B.S. and M.S. degrees after completing the requirements for the two programs. A student wishing to pursue the 5-year M.S. program must make a formal application to the MEES program in the first semester of the Junior year. Students must take the GRE (General Test) during their junior year. They have the option of being in residence at UMES or at a participating CEES campus during their senior and fifth years.

Students enrolled in the Environmental Chemistry option must complete 120 semester hours of undergraduate courses and 30 semester hours graduate courses for their degrees: 42 semester hours in general education courses, 29 semester hours in undergraduate program core courses, 11 semester hours of program electives and 45 semester hours of supportive courses. To receive the M.S. degree, students must satisfy degree requirements which include a total of 21 course credits: course work (15 credits) and Master's Thesis research (6 credits).

Students who enroll in the Marine Science option must complete 120 semester hours of undergraduate courses and 30 semester hours of graduate courses for their degrees: 42 semester hours of general education courses, 41 semester hours of undergraduate program core courses, 38 semester hours of supportive courses and 9 semester hours of program elective courses. To receive the M.S. degree, students must satisfy degree requirements which include a total of 30 course credits: course work (24 credits) and Master's Thesis research (6 credits).

Pre-Pharmacy Curriculum: Pre pharmacy students must complete 73 semester hours of courses with a grade of "C" or better, which include a minimum of 20 hours of biology and chemistry at the 200 level or above and 8 hours of physics courses.

BIOLOGY NON-TEACHING

DEPARTMENTAL REQUIREMENTS

Students majoring in Biology Non-Teaching must complete a total of 120¹ credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 31 semester hours of Supportive courses and 2 semester hours of free electives. The specific courses taken in the undergraduate program are generally chosen based on the goals of the student for their future career.

OBJECTIVES

The objectives of the Biology Program are to:

1. Provide Biology majors in the Department of Natural Sciences with the knowledge and information necessary to achieve success in graduate and/or professional schools and the workforce;
2. Provide Biology majors with advanced knowledge and information in the fields general Biology and/or Ecology;
3. Increase the level of competency in laboratory techniques and skills of Biology majors in the Department of Natural Sciences; and
4. Develop technical communication and critical thinking skills of Biology majors in the Department of Natural Sciences and train the same through mentoring and personal experience to conduct scientific research.

COMMON REQUIRED COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 223	BIOL 303	
BIOL 112			
BIOL 114			

CAREER OPPORTUNITIES

A Biology degree has many career opportunities based on a person's interests and undergraduate preparation. Biologists can pursue a biomedical or graduate degree for entrance into a specialized area of medicine, dentistry, academia, research or consulting careers. Three resources for careers opportunities are the following websites: Sciencecareers.sciencemag.org covers all sciences while www.aibs.org/careers covers all area of Biology and www.ecoemploy.com covers the ecological and environmental fields.

REQUIRED MAJOR COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 223	BIOL 303	BIOL 498
BIOL 112			BIOL 499
BIOL 114			

¹Minimum Maryland Higher Education Committee (MHEC) requirements for a Bachelor of Science Degree.

CURRICULUM GUIDE FOR BIOLOGY - NON-TEACHING

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL 222	3
CHEM 211	3	BIOL 223	1
CHEM 213	1	CHEM 212	3
EDHE 111	3	CHEM 214	1
ENGL 203	3	ENGL 305 or	
GEN ED CURR. AREA	<u>3</u>	ENGL 310	3
	17	CSDP 121 or	
		BUED 212	3
		CSDP 220	<u>4</u>
			18

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL Elective	4
BIOL 301	3	PHYS 122 and	
BIOL 303	1	PHYS 124 or	
GEN ED CURR AREA I	3	PHYS 182H and	3
PHYS 121 and		PHYS 184	1
PHYS 123 or		GEN ED CURR AREA I	3
PHYS 181H and	3	GEN ED CURR AREA II	<u>3</u>
PHYS 183H	<u>1</u>		14
	15		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL Elective	4
BIOL 497	1	BIOL 499	4
BIOL 498	3	CHEM 342	3
CHEM 341	3	CHEM 344	1
CHEM 343	1	MATH 210	<u>3</u>
DNSC 400	1		15
FREE Elective	<u>2</u>		
	15		

Total Credit Hours: 120

BIOLOGY NON-TEACHING HONORS

DEPARTMENTAL REQUIREMENTS

Students majoring in Biology Non-Teaching Honors must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 32 semester hours of Supportive courses and 2 semester hours of free electives. The admission of students to the undergraduate program in Biology is based upon the general admission requirements of the University. Minimum requirements for application to the UMES Honors Program include a cumulative grade point average of 3.3 and minimum SAT score of 1650. Additionally, for retention in the Honors Program, each student must maintain a semester grade point average of 3.0 in their major courses and a cumulative GPA of 3.3. Students must complete a minimum of two honors courses each semester. Honors students interested in the pre-medicine and pre-dentistry tracks should consult the section in the catalogue describing the pre-medicine Biology major emphasis.

OBJECTIVES

The primary mission of The Honors Biology Program is to prepare academically talented students for entry into graduate and professional schools with an emphasis on admission into PhD graduate programs, and also professional schools that offer degrees in Doctor of Medicine*, Dental Surgery*, Pharmacy and Veterinary Medicine. The objectives are to:

1. Provide Biology majors with advanced knowledge and information in the fields of General Biology and/or Ecology in courses at an accelerated rate;
2. Develop competencies in laboratory techniques and skills that will be necessary upon entrance into the professional working environment; and
3. Develop technical, communication and critical thinking skills of Biology majors in the Department of Natural Sciences and train the same through mentoring and personal experience to conduct scientific research.

COMMON REQUIRED COURSES

BIOL 111 ¹	BIOL 222	BIOL 301	BIOL 497
BIOL 113 ¹	BIOL 223	BIOL 303	
BIOL 112 ¹			
BIOL 114			

CAREER OPPORTUNITIES

The Honors Curriculum is challenging and facilitates acceptance into internships furthering the student's career at UMES. As graduates have a higher rate of entry into graduate programs nationwide, they can pursue a biomedical or graduate degree for entrance into a specialized area of medicine, dentistry, academia, research or consulting careers. Three resources for careers opportunities are the following websites: Sciencecareers.science.org covers all sciences while www.aibs.org/careers covers all area of Biology and www.ecoemploy.com covers the ecological and environmental fields.

The specific courses taken in the undergraduate program are generally chosen based on the goals of the student for their future career.

REQUIRED MAJOR COURSES

BIOL 111 ¹	BIOL 222	BIOL 301	BIOL 497
BIOL 113 ¹	BIOL 223	BIOL 303	BIOL 498
BIOL 112 ¹			BIOL 499
BIOL 114 ¹			

¹Honors Program students are required to enroll in the Honors sections of these courses.

CURRICULUM GUIDE FOR BIOLOGY NON-TEACHING HONORS¹

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111H	3	BIOL 112H	3
BIOL 113H	1	BIOL 114H	1
CHEM 111H	3	CHEM 112H	3
CHEM 113H	1	CHEM 114H	1
DNSC 100	1	ENGL 102H	3
ENGL 101H	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL 222	3
CHEM 211H	3	BIOL 223	1
CHEM 213H	1	BUED 212	3
EDHE 111	3	CHEM 212H	3
ENGL 203	3	CHEM 214H	1
GEN ED CURR AREA II (Honors)	<u>3</u>	ENGL 305H or	
	17	ENGL 310	<u>3</u>
			14

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL Elective	4
BIOL 301	3	GEN ED CURR AREA I (Honors)	3
BIOL 303	1	GEN ED CURR AREA II	3
GEN ED CURR AREA ¹	3	PHYS 182H	3
PHYS 181H	3	PHYS 184H	<u>1</u>
PHYS 183H	<u>1</u>		14
	15		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 498H	3	BIOL Elective	4
BIOL Elective	4	BIOL 499H	4
BIOL 497H	1	CHEM 342H	3
CHEM 341H	3	CHEM 344H	1
CHEM 343H	1	MATH 210	<u>3</u>
DNSC 400	1		15
FREE Elective	<u>2</u>		
	15		

Total Credit Hours: 120

¹Students in the Honors, Pre Medicine or Pre Dentistry programs are required to enroll in all sections designated "H". They are required to take the Medical College Admission Test (MCAT) during the Spring semester of the academic year preceding the year in which admission to medical school is sought. Applications to medical school(s) should be made no later than the fall of the senior year. Genetics, Cell Biology, Comparative Vertebrate Anatomy, Histology and Microbiology are strongly recommended.

BIOLOGY NON-TEACHING - PRE-MEDICINE TRACK

DEPARTMENTAL REQUIREMENTS

Students majoring in Biology with Pre-Med/Pre-Dentistry Tracks must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 19 semester hours of program electives and 34 semester hours of Supportive courses .

OBJECTIVES

The objectives of the Biology Program are to:

1. Provide Biology majors in the Department of Natural Sciences with the knowledge and information necessary to gain entry into Medical School;
2. Provide Biology majors with a curriculum that would advance their general knowledge in the field of Biology that is necessary for successfully completing standardized examinations required for the entry into Medical School;
3. Increase the level of competency in laboratory techniques and skills of Biology majors in the Department of Natural Sciences to ultimately prepare the student for the rigors of Medical School; and
4. Develop technical communication and critical thinking skills of Biology majors in the Department of Natural Sciences and train the same through mentoring and personal experience to perform in medical programs.

COMMON REQUIRED COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 223	BIOL 303	
BIOL 112			
BIOL 114			

CAREER OPPORTUNITIES

A Biology degree has many opportunities based on a person's interests and undergraduate preparation. Biologists can pursue a biomedical or graduate degree for entrance into a specialized area of medicine, dentistry, academia, research or consulting careers. Three resources for careers opportunities are the following websites: Sciencecareers.sciencemag.org covers all sciences while www.aibs.org/careers covers all area of Biology and www.ecoemploy.com covers the ecological and environmental fields. The specific courses taken in the undergraduate program are generally chosen based on the goals of the student for their future career.

REQUIRED MAJOR COURSES

BIOL 111	BIOL 222	BIOL 497
BIOL 113	BIOL 223	BIOL 498
BIOL 112	BIOL 301	BIOL 499
BIOL 114	BIOL 303	

CURRICULUM GUIDE FOR BIOLOGY NON-TEACHING - PRE-MEDICINE/PRE-DENTISTRY TRACK

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	BIOL 222	3
CHEM 213	1	BIOL 223	1
MATH 210	3	CHEM 212	3
PSYC 200	3	CHEM 214	1
GEN ED CURR AREA I	<u>3</u>	CSDP 220 or	4
	13	CSDP 212	3
		ENGL 203	<u>3</u>
			14/15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 311	4	BIOL 301	3
BIOL 322	4	BIOL 303	1
EDHE 111	3	BIOL 341	4
PHYS 121	3	ENGL 305/Honors/Online	3
PHYS 123	<u>1</u>	PHYS 122	3
	15	PHYS 124	<u>1</u>
			15

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 326	3	BIOL 436	3
BIOL 327	1	BIOL 498	3
BIOL420	3	CHEM 342	3
BIOL 421	1	CHEM 344	1
BIOL 497	1	GEN ED CURR AREA I	3
CHEM 341	3	SOCI 101	<u>3</u>
CHEM 343	1		16
DNSC 400	1		
ENGL 218	<u>3</u>		
	17		

Total Credits Hours: 120

¹Students in the Pre-Medicine/Pre-Dentistry programs are required to take the Medical College Admission Test (MCAT) during the Spring semester of the academic year preceding the year in which admission to medical school is sought. Applications to medical school(s) should be made no later than the fall of the senior year. Genetics, Cell Biology, Comparative Vertebrate Anatomy, Histology and Microbiology are strongly recommended.

**BIOLOGY - NON-TEACHING
PRE-PHYSICAL THERAPY TRACK**

DEPARTMENTAL REQUIREMENTS

Students majoring in Biology Non-Teaching with Pre-Physical Therapy Track must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 25 semester hours of Departmental Core courses, 20 semester hours of program electives, 31 semester hours of Supportive courses and 2 semester hours of free electives.

OBJECTIVE

The objective of the Biology Pre Physical Therapy Program is to prepare students to meet the requirements for application to professional programs leading to the DPT degree.

COMMON REQUIRED COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 233	BIOL 303	
BIOL 112			
BIOL 114			

CAREER OPPORTUNITIES

Graduates of this program will be prepared for entry into the doctor of Physical therapy degree at UMES or any other institutions of their choice. Also, biologists can pursue a biomedical or graduate degree for entrance into a specialized area of medicine, dentistry, academia, research or consulting careers. Three resources for careers opportunities are the following websites: Sciencecareers.sciencemag.org covers all sciences while www.aibs.org/careers covers all area of Biology and www.ecoemploy.com covers the ecological and environmental fields. The specific courses taken in the undergraduate program are generally chosen based on the goals of the student for their future career.

REQUIRED BIOLOGY MAJOR COURSES

BIOL 111	BIOL 301	BIOL 498
BIOL 113	BIOL 303	BIOL 489
BIOL 112		BIOL 497
BIOL 114		

**CURRICULUM GUIDE FOR BIOLOGY NON-TEACHING
PRE-PHYSICAL THERAPY TRACK**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL 222	3
CHEM 211	3	BIOL 223	1
CHEM 213	1	CHEM 212	3
EDHE 111	3	CHEM 214	1
BIOL 203	3	CSDP 220 or	
GEN ED CURR AREA I	<u>3</u>	CSDP 121 or	
	17	BUED 212	3
		ENGL 305 or	
		ENGL 310	<u>3</u>
			14

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL Elective	4
BIOL 301	3	PHYS 122 and	
BIOL 303	1	PHYS 124 or	
GEN ED CURR AREA I	3	PHYS 182H and	3
PHYS 121 and		PHYS 184 H	1
PHYS 123 or		GEN ED CURR AREA I	3
PHYS 181H	3	GEN ED CURR AREA II	<u>3</u>
PHYS 183H	<u>1</u>		14
	15		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	4	BIOL Elective	4
BIOL 497	1	BIOL 499	4
BIOL 498	3	CHEM 342	3
CHEM 341	3	CHEM 344	1
CHEM 343	1	MATH 210	<u>3</u>
FREE Elective	3		15
DNSC 400	<u>1</u>		
	16		

Total Credit Hours: 120

BIOLOGY EDUCATION - TEACHING

DEPARTMENTAL REQUIREMENTS

Students in the major must complete a total of 120 credit hours of University courses. This includes a minimum of 42 semester hours of General Education Requirements, 17 semester hours of Departmental Core courses, 3 semester hours of program electives, 42 semester hours of professional Education courses, and 16 semester hours of Supportive courses.

Students who meet University of Maryland Eastern Shore's admission requirements can enroll in Biology Education. Prospective Biology Teacher Education candidates are not formally admitted to the Professional Education Unit until they have completed an Application to Teacher Education and have been accepted.

Teacher candidates who wish to major in Biology Education must have an overall and major content grade point average of 2.75 for admission into and retention in the program. For admission, overall GPA of 2.75 or higher in a minimum of 45 approved semester hours is required, passing the University's English Proficiency Seminar, and also PRAXIS I (scheduled and administered by Educational Testing Services) while registered for Praxis preparation course (Credit 1) EDCI 201.

	Passing Praxis Scores	
	Paper/Pencil Test	Computer-Based Test
Reading	177	325
Mathematics	177	322
Writing	173	319

Applications must be completed for admission to the Biology Education teacher program within the scheduled deadline. The teacher education application lists specific course requirements and requires two essays which address potential candidate's disposition toward teaching, as well as providing writing samples, and field experience recommendation. Four letters of recommendation from faculty (one has to be from the advisor) are also required.

Grades of "C" or above must be attained in each required course of the Biology Education major, the specialized content area combined with the professional educational courses. A candidate's progress is monitored each semester by the academic advisor to ensure that the candidate continues to meet the minimum GPA of 2.75 in both the major and overall course work.

In order to be eligible for internship, Biology Education candidates are required to submit the following indicators: application for internship, field experience, and pre-internship recommendations, methods instructor recommendations, formal academic measures including a 2.75 or higher overall grade point average, a 2.75 grade point average in the major, with no grades lower than C in all courses, PRAXIS II passing scores in Biology, and working portfolio review.

All Biology Education candidates must satisfactorily complete the independent research project and manuscript prior to graduation. The candidates must satisfactorily complete the professional portfolio, which is started early in the program and revised and completed during the internship experience, is tied to the INTASC Principles, Unit's Conceptual Framework, and NSTA standards prior to graduation. They must also complete an Exit Survey.

OBJECTIVES

The objectives of the Biology Education Program are as to:

1. Expose teacher candidates in Biology from diverse cultural backgrounds to the breadth and depth of content knowledge in Biology and related sciences necessary for fulfilling requirements of teaching careers in diverse cultural settings.
2. Train future teachers in Biology who will be competent in the application of modern technological advances in innovative ways of thinking and approaching critical issues related to both science and education.
3. Provide future teachers the opportunity to acquire mastery of skills through constant reflection of their teaching and techniques that are used to obtain, analyze, and interpret scientific information.

COMMON REQUIRED COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 223	BIOL 303	BIOL 498
BIOL 112			BIOL 499
BIOL 114			

CAREER OPPORTUNITIES

Apart from the employment opportunities outlined in Biology non-teaching program, the students receiving the teaching degree with Praxis I and II licensure can choose to enter a teaching career in secondary education.

REQUIRED MAJOR COURSES

BIOL 111	BIOL 222	BIOL 301	BIOL 497
BIOL 113	BIOL 223	BIOL 303	BIOL 498
BIOL 112			BIOL 499
BIOL 114			
EDCI 200 ²	EDSP 428 ²	PSYC 305 ¹	
EDCI 311 ²		PSYC 307 ¹	
EDCI 406 ²			
EDCI 409 ²			
EDCI 410 ²			
EDCI 425A ²			
EDCI 480/490 ³			

¹**Clinical Experiences** may consist of interviewing a student, teacher, or administrator, observing a meeting or a conference; visiting a school or community resource center; developing a case study; peer teaching; administering a test; or attending a meeting or a conference. Clinical Experiences generally require a limited amount of time in a school or with a student (10 hours). Teacher Candidates are asked to submit a report or a reflective journal that documents the completion of the assignment.

²**Field Experiences** always occur in a school setting and consist of 10 to 25 hours of visitation per course. The times vary based on the course requirement. Field Experiences usually require a student to keep a reflective journal which is submitted as part of the final grade. Listed below are the clinical and field experiences required for all professional courses in Biology Education.

³In **EDCI 480/490 (Internship)**, the teacher candidates in Biology have a full semester of student teaching—a middle school experience and a high school experience. Candidates are under the direct supervision of a Science Cooperating Teacher in Biology and also supervised by the University Supervisor who also serves as the Teacher Educator (Instructor of Methods and Internship) of Biology Education. University supervisor is required to observe and conference with the candidate and cooperating teacher a minimum of eight times, four times per student teaching placement, with an additional introductory meeting for each placement. Candidates begin by taking one or two classes from their cooperating teacher's schedule of teaching, and gradually picking up more until they have the experience of teaching a full load. The candidates are expected to demonstrate effective teaching skills such as facilitating collaborative group learning, motivating, and encouraging student learning activities, and assessing students' responses. They are to design a bulletin board display, prepare appropriate instructional materials, observe teaching, interview school personnel, participate in parent meetings, evaluate student work using multiple assessments, and become involved in the life of the school and the full role of a teacher. Documentation of performance based outcomes, as well as summative evaluative reports are prepared by cooperating teachers, based on their day-to-day experiences with the candidate, and by the university supervisor based on the observational visits and discussions with the candidates and cooperating teachers.

CURRICULUM GUIDE FOR BIOLOGY EDUCATION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
ENGL 101	3	EDHE 111	3
GEN ED CURR AREA II	3	ENGL 102	3
DNSC 100	1	ENGL 001	0
MATH 110	<u>3</u>	GEN ED CURR AREA I	3
	14	GEN ED CURR AREA II	<u>3</u>
			16

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL Elective	3	BIOL 222	3
CHEM 111	3	BIOL 223	1
CHEM 113	1	CHEM 112	3
EDCI 288 ¹	1	CHEM 114	1
EDCI 200	3	ENGL 305Online or	
ENGL 203	<u>3</u>	ENGL 301Online	3
	13	MATH 210	3
		PSYC 305	<u>3</u>
			17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 301	3	PHYS 122	3
BIOL 303	1	PHYS 124	1
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
EDCI 311	3	EDCI 406	3
PHYS 121	3	EDCI 409	<u>3</u>
PHYS 123	1		14
PSYC 307	<u>3</u>		
	18		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 497	1	EDCI 400	3
EDCI 410	3	EDCI 480	6
EDCI 425A	3	EDCI 490	<u>6</u>
EDSP 428	3		15
GEN ED CURR AREA I	<u>3</u>		
	13		

Total Credit Hours: 120

¹Credit does not count toward graduation.

CHEMISTRY NON-TEACHING ACS CERTIFICATION¹

DEPARTMENTAL REQUIREMENTS

To obtain an ACS-certified chemistry degree, students must complete a total of 120 credit hours of University courses. This includes a minimum of 52 semester hours of program core courses, 15-16 hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses, and 2 hours of free electives courses from the approved lists of requirements as outlined in the catalog. The students must also follow ACS guidelines for CHEM 499 (undergraduate research). This includes research project conducted at UMES and comprehensive research report. The report should be written to meet the ACS requirement as outlined in the ACS document "Guidelines for Preparing a Research Report." For more information, please refer to the ACS website www.ACS.org.

OBJECTIVES

The objectives of the Chemistry Program are to:

1. Train students through demonstration, mentoring and personal experience to gain knowledge and develop chemical skills necessary to conduct scientific research.
2. Impart students with contemporary laboratory techniques and skills required to conduct scientific investigations.
3. Provide students with the academic curricula necessary to develop a strong understanding and knowledge of chemical theory and practice.
4. Expose teacher candidates in Chemistry from diverse cultural backgrounds to the breadth and depth of content knowledge in Chemistry and related sciences necessary for fulfilling requirements of teaching careers in diverse cultural settings.
5. Train future teachers in Chemistry who will be competent in the application of modern technological advances in innovative ways of thinking and approaching critical issues related to both science and education.
6. Provide future teachers the opportunity to acquire mastery of skills through constant reflection of their teaching and techniques that are used to obtain, analyze, and interpret scientific information.
7. Provide development opportunities to faculty to accomplish the objectives above.

COMMON REQUIRED COURSES

CHEM 111	CHEM 211	CHEM 311
CHEM 113	CHEM 213	CHEM 401
CHEM 112	CHEM 212	CHEM 497/497M
CHEM 114	CHEM 214	CHEM 499

CAREER OPPORTUNITIES

Students graduating with a Bachelor's of Science in Chemistry will be employable in chemical related fields. They may opt to apply for admission to medical or other health professional schools such as Pharmacy, Physician Assistant or Physical Therapy School. These students are also eligible to apply for admission to graduate school. Students who choose not to pursue a terminal degree can work in industry as chemists for biotechnology, pharmaceutical or environmental management companies. Graduates can also work for government agencies such as NSF (National Science Foundation), NIH (National Institutes of Health), FDA (Food and Drug Administration), EPA (Environmental Protection Agency), NIST (National Institute of Standards and Technology), NOAA (National Oceanic and Atmospheric Administration), FBI (Federal Bureau of Investigation), and CIA (Central Intelligence Agency). Websites which describe careers in chemistry include: The ACS website www.ACS.org, <http://chemistry.about.com/cs/5/f/blcareers.htm>, and <http://www.chemistryguide.org/jobs-in-chemistry.html>. The students should look at the sites for each of companies listed above.

¹ACS Certification - The Chemistry Program received approval from the American Chemical Society (ACS) to grant ACS certified degrees in 2003.

REQUIRED MAJOR COURSES

CHEM 111	CHEM 211	CHEM 311	CHEM 401
CHEM 113	CHEM 213	CHEM 312	CHEM 402
CHEM 112	CHEM 212	CHEM 341	CHEM 420
CHEM 114	CHEM 214	CHEM 343	CHEM 421
			CHEM 497/497M
			CHEM 498
			CHEM 499

**CURRICULUM GUIDE FOR CHEMISTRY - NON-TEACHING
ACS CERTIFICATION**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
GEN ED CURR AREA I ¹	3	GEN ED CURR AREA I ¹	3
PHYS 161 <i>and</i> PHYS 163 <i>or</i>		PHYS 262 <i>and</i> PHYS 264 <i>or</i>	
PHYS 181H <i>and</i>	3	PHYS 182H <i>and</i>	3
PHYS 183H	1	PHYS 184H	1
MATH 211	<u>4</u>	ENGL 203	<u>3</u>
	15		14

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 311	4	CHEM 312	4
CHEM 341	3	CHEM 497	1
CHEM 343	1	CHEM 498	3
ENGL 305 <i>or</i> ENGL 310	3	CHEM Elective	3
GEN ED CURR AREA II	<u>3</u>	CSDP 121 <i>or</i> BUED 212 <i>or</i> CSDP 220 ²	3 4
	14	GEN ED CURR AREA II	<u>3</u>
			18

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
DNSC 400	1	Elective with Lab Component ³	4
CHEM 401	4	CHEM 402	4
CHEM 420	4	CHEM 499	4
CHEM 421	4	FREE Elective	<u>2</u>
EDHE 111	<u>3</u>		14
	16		

Total Credit Hours: 120

¹Two semesters of foreign language are required to fulfill general education requirement.

²CSDP 220 may be substituted with either CSDP 121 or BUED 212, three credits each, and make up one credit somewhere else.

³Elective with Lab Component must be in the area of Chemistry.

**CHEMISTRY HONORS- NON-TEACHING
ACS CERTIFICATION¹
PRE-MEDICINE/PRE-DENTISTRY**

DEPARTMENTAL REQUIREMENTS

Students must complete a total of 120 credit hours of University courses to obtain an ACS-certified chemistry degree. This includes 48-49 semester hours of program core courses, 18-19 hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses, and 3 hours of free electives courses from the approved lists of requirements as outlined in the catalog. The students must also follow ACS guidelines for CHEM 499 (undergraduate research). This includes a research project conducted at UMES and a comprehensive research report. The report should be written to meet the ACS requirement as outlined in the ACS document "Guidelines for Preparing a Research Report." From more information, please refer to the ACS website, www.ACS.org.

OBJECTIVES

The objectives of the Chemistry Honors/PreMedicine/PreDentistry Program are to prepare academically talented students to enter graduate and professional schools with the intention of obtaining terminal degrees (such as PhD, MD, PharmD, DVM, DOM, DDS). With the accelerated curricula including advanced techniques, we:

1. Train students through demonstration, mentoring and personal experience to gain knowledge and develop chemical skills necessary to conduct scientific research.
2. Impart students with contemporary laboratory techniques and skills required to conduct scientific investigations.
3. Provide students with the academic curricula necessary to develop a strong understanding and knowledge of chemical theory and practice.

COMMON REQUIRED COURSES²

CHEM 111H	CHEM 211H	CHEM 341H	CHEM 497H/497M
CHEM 113H	CHEM 213H	CHEM 401	CHEM 499
CHEM 112H	CHEM 212H		
CHEM 114H	CHEM 214H		

REQUIRED MAJOR COURSES

CHEM 111H	CHEM 211H	CHEM 311	CHEM 401
CHEM 113H	CHEM 213H	CHEM 312	CHEM 402
CHEM 112H	CHEM 212H	CHEM 341H	CHEM 420
CHEM 114H	CHEM 213J	CHEM 343H	CHEM 421
			CHEM 497H/497M
			CHEM 499

CAREER OPPORTUNITIES

Students graduating with an Honors Non-Teaching Degree, ACS-certified, will be trained for leadership roles in Chemistry or Chemistry related fields. They may opt to apply for admission to medical or other health professional schools such as Pharmacy, Physician Assistant or Physical Therapy School, and/or graduate school. Students can work in industry as chemists for biotechnology, pharmaceutical or environmental management companies. Graduates can also work for government agencies such as NSF (National Science Foundation), NIH (National Institutes of Health), FDA (Food and Drug Administration), EPA (Environmental Protection Agency), NIST (National Institute of Standards and Technology), NOAA (National Oceanic and Atmospheric Administration), FBI (Federal Bureau of Investigation), and CIA (Central Intelligence Agency). Websites which describe careers in chemistry include: The ACS website www.ACS.org, <http://chemistry.about.com/cs/5/f/blcareers.htm>, and <http://www.chemistryguide.org/jobs-in-chemistry.html>. The students should look at the sites for each of companies listed above.

Students in the Pre-Medicine/Pre-Dentistry program are recommended to take the Medical College Admission Test (MCAT) during the Fall Semester of the academic year preceding the year in which admission to medical school is sought. It is highly recommended that the student enroll in a preparatory class prior to the Fall semester to which they have registered to take the exam. Students should be aware of the submission deadlines and it is recommended that applications to medical school(s) be made no later than the fall of the senior year. Genetics, Cell Biology, Comparative Vertebrate Anatomy, Histology and Microbiology are strongly recommended.

¹ACS Certification - The Chemistry Program received approval from the American Chemical Society (ACS) to grant ACS certified degrees in 2003.

²Students should take Honors courses when offered. Both Lecture and Lab must be taken.

CURRICULUM GUIDE FOR CHEMISTRY HONORS¹
NON-TEACHING - ACS CERTIFICATION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111H	3	BIOL 112H	3
BIOL 113H	1	BIOL 114H	1
CHEM 111H	3	CHEM 112H	3
CHEM 113H	1	CHEM 114H	1
DNOC 100	1	ENGL 102H	3
ENGL 101H	3	ENGL 001	0
MATH 111H	<u>4</u>	MATH 112	<u>4</u>
	16		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211H	3	CHEM 212H	3
CHEM 213H	1	CHEM 214H	1
GEN ED CURR AREA I	3	GEN ED CURR AREA I	3
MATH 211	4	CSDP 220 or	4
PHYS 181H	3	BUED 212 ²	3
PHYS 183H	<u>1</u>	PHYS 182H	3
	15	PHYS 184H	<u>1</u>
			15

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 311	4	CHEM 312	4
CHEM 341H	3	CHEM 497H	1
CHEM 343H	1	CHEM 498H	3
ENGL 203	3	CHEM Elective	3
GEN ED CURR AREA II	<u>3</u>	ENGL 305H or	
	14	ENGL 310H	3
		FREE Elective	<u>1</u>
			15

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 421	4	GEN ED CURR AREA II	3
CHEM 420	4	Elective with Lab Component ³	4
CHEM 401	4	CHEM 402	4
DNOC 400	1	CHEM 499H	<u>3</u>
EDHE 111	<u>3</u>		14
	16		

Total Credit Hours: 120

¹Students in the Honors/Pre-Medicine/Pre-Dentistry program are to enroll in all sections designated "H".

²CSDP 220 may be substituted for BUED 212, three credits, and make up one credit somewhere else.

³Elective with Lab Component must be in the area of Chemistry.

CHEMISTRY NON-TEACHING WITHOUT ACS CERTIFICATION

DEPARTMENTAL REQUIREMENTS

Students must complete a minimum of 120 credit hours which include 52 semester hours of program core courses, 15 (16) hours of supportive courses, 7-8 hours of program electives courses, 43 hours of general education courses and 2 hours of free electives courses from the approved lists of requirements as outlined in the catalog. Students are not required to follow the ACS course guidelines since the degree is non-ACS certified.

OBJECTIVES

The objectives of the Chemistry Program are to:

1. Train students through demonstration, mentoring and personal experience to develop chemical skills and to conduct scientific research.
2. Impact students with contemporary laboratory techniques and skills required to conduct scientific investigations.
3. Provide students with the academic curricula necessary to develop a strong understanding and knowledge of chemical theory and practice.

COMMON REQUIRED COURSES

CHEM 111	CHEM 211	CHEM 311	CHEM 401
CHEM 113	CHEM 213		CHEM 497/497M
CHEM 112	CHEM 212		CHEM 499
CHEM 114	CHEM 214		

**CURRICULUM GUIDE FOR CHEMISTRY - NON-TEACHING
WITHOUT ACS Certification**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Sophomore Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
GEN ED CURR AREA I ¹	3	GEN ED CURR AREA I ¹	3
PHYS 121	3	PHYS 122	3
PHYS 123	1	PHYS 124	1
MATH 211	<u>4</u>	ENGL 203	<u>3</u>
	15		14

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Sophomore Year</i>	<i>Credit</i>
CHEM 311	4	CHEM 312	4
CHEM 341	3	CHEM 497	1
CHEM 343	1	CHEM 498	3
ENGL 305 or		CSDP 121 or	
ENGL 310	3	BUED 212 or	3
GEN ED CURR AREA II	<u>3</u>	CSDP 220 ²	4
	14	GEN ED CURR AREA II	<u>3</u>
			17

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 401	4	Elective with Lab Component ³	4
CHEM 420	4	CHEM 402	4
CHEM 421	4	CHEM 499	4
DNSC 400	1	EDHE 111	<u>3</u>
FREE Elective	<u>1</u>		15
	14		

Total Credit Hours: 120

¹Two semesters of foreign language are required to fulfill general education requirement.

²CSDP 220 may be substituted with either CSDP 121 or BUED 212, three credits each, and make up one credit somewhere else.

³Elective with Lab Component must be in the area of Chemistry.

CHEMISTRY EDUCATION TEACHING

DEPARTMENTAL REQUIREMENTS

Candidates are required to earn no less than a C average in the courses listed below and maintain a minimum GPA of 2.75 in each of the General Education, Core Course, Supportive Course and Professional Education requirement category. Listed below are the clinical¹ and field² experiences required for all professional courses in Chemistry Education. Students will complete 110 hours which include 90 hours of Field Experience and 20 hours of Clinical Experience.

OBJECTIVES

The objectives of the Chemistry Teaching Program are to:

1. Train students through demonstration, mentoring and personal experience to develop chemical skills and to conduct scientific research.
2. Impart students with contemporary laboratory techniques and skills required to conduct scientific investigations.
3. Provide students with the academic curricula necessary to develop a strong understanding and knowledge of chemical theory and practice.
4. Expose teacher candidates in Chemistry from diverse cultural backgrounds to the breadth and depth of content knowledge in Chemistry and related sciences necessary for fulfilling requirements of teaching careers in diverse cultural settings.
5. Train future teachers in Chemistry who will be competent in the application of modern technological advances in innovative ways of thinking and approaching critical issues related to both science and education.
6. Provide future teachers the opportunity to acquire mastery of skills through constant reflection of their teaching and techniques that are used to obtain, analyze, and interpret scientific information.

INTERNSHIPS

EDCI 480/490 Internship -2 consecutive 7-8 week (5 days/week) placement at 2 different sites (Refer to the course description). In EDCI 480/490 (Internship), the teacher candidates in Chemistry have a full semester of student teaching-a middle school experience and a high school experience. Candidates are under the direct supervision of a Science Cooperating Teacher in Chemistry and also supervised by the University Supervisor who also serves as the Teacher Educator (Instructor of Methods and Internship) of Chemistry Education. University supervisor is required to observe and has conference with the candidate and cooperating teacher a minimum of eight times, four times per student teaching placement, with an additional introductory meeting for each placement. Candidates begin by taking one or two classes from their cooperating teacher's schedule of teaching, and gradually picking up more until they have the experience of teaching a full load. The candidates are expected to demonstrate effective teaching skills such as facilitating collaborative group learning, motivating, and encouraging student learning activities, and assessing students' responses. They should design a bulletin board display, prepare appropriate instructional materials, observe teaching, interview school personnel, participate in parent meetings, evaluate student work using multiple assessments, and become involved in the life of the school and the full role of a teacher. Documentation of performance based outcomes, as well as summative evaluative reports are prepared by cooperating teachers, based on their day-to-day experiences with the candidate, and by the university supervisor based on the observational visits and discussions with the candidates and cooperating teachers.

¹**Clinical Experiences** are those experiences which are based on a very specific purpose. They may consist of interviewing a student, teacher, or administrator, observing a meeting or a conference; visiting a school or community resource center; developing a case study; peer teaching; administering a test; or attending a meeting or a conference. Clinical Experiences generally require a limited amount of time in a school or with a student (10 hours). Teacher Candidates are asked to submit a report or a reflective journal that documents the completion of the assignment

²**Field Experiences** always occur in a school setting and consist of 10 to 25 hours of visitation per course. The times vary based on the course requirement. Field Experiences usually require a student to keep a reflective journal which is submitted as part of the final grade.

COMMON REQUIRED COURSES

CHEM 111	CHEM 211	CHEM 311	CHEM 401
CHEM 112	CHEM 212		CHEM 497/497M
CHEM 113	CHEM 213		CHEM 499 ¹
CHEM 114	CHEM 214		

REQUIRED MAJOR COURSES

CLINICAL

PSYC 305	10 hours
PSYC 307	10 hours

FIELD

EDCI 200	10 hours
EDCI 311	10 hours
EDSP 428	10 hours
EDCI 406	15 hours
EDCI 409	15 hours
EDCI 410	15 hours
EDCI 425A	25 hours

CAREER OPPORTUNITIES

Students graduating with the NCATE-certified Chemistry Education (Teaching) Degree with Praxis I and II Licensure can choose to enter a teaching career in secondary education

CURRICULUM GUIDE FOR CHEMISTRY EDUCATION TEACHING

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	ENGL 102	3
BIOL 113	1	ENGL 001	0
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	EXSC 111 ¹	3
ENGL 101	3	GEN ED CURR AREA II	3
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		17

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
CSDP 220 ²	4	GEN ED CURR AREA I	3
EDCI 200	3	PSYC 305	3
EDCI 288 ³	1	PSYC 307	<u>3</u>
MATH 211	<u>4</u>		13
	15		

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 311	4	CHEM 499	1
CHEM 497	1	EDCI 406	3
EDCI 311	3	ENGL 305 or	
ENGL 203	3	ENGL 310	3
GEN ED CURR AREA I ⁴	<u>3</u>	GEN ED CURR AREA II	3
	14	PHYS 161	3
		PHYS 163	<u>1</u>
			14

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 401	4	EDCI 400	3
EDCI 425A	3	EDCI 480	6
EDCI 409	3	EDCI 490	<u>6</u>
EDSP 428	3		15
PHYS 262	3		
PHYS 264	<u>1</u>		
	17		

Total Credit Hours: 120

¹EXSC 111 cannot be repeated for credit.

²CSDP 220 may be substituted with either CSDP 121 or BUED 212, three credits each, and make up one credit somewhere else.

³Credit does not count toward graduation.

⁴Two semesters of foreign language are required to fulfill general education requirement.

ENVIRONMENTAL SCIENCES

The Environmental Sciences major has two options Chemistry or Marine Science. The concept of each Option is indicated below.

DEPARTMENTAL REQUIREMENTS

Environmental Sciences majors must complete 120 semester hours: 42 semester hours in general education courses, 29 semester of hours in program core courses, 46 semester hours in program supportive courses and 3 semester hours in electives. Students are required, to take independent study and/or undergraduate research in their junior or senior year. Most faculty are actively involved in research projects with undergraduate students. Students must receive a grade of "C" or better in both lecture and lab component to progress to the next sequence course.

OBJECTIVES

The program in Environmental Sciences has been developed to:

1. Create in the student abilities of critical and reflective thought relating to the many aspects of environmental concerns.
2. Train students to use the interdisciplinary approach involving the areas of Biology, Chemistry, Physics, Computer Sciences and Economics.
3. Provide students with the academic curricula necessary to develop a strong understanding and knowledge of the environment.
4. Impart students with laboratory techniques and skills required to conduct scientific investigation.
5. Train students, through example, mentoring and personal experience, to develop chemical, biological, physical and social skills to conduct environmental research.

CAREER OPPORTUNITIES

A degree in Environmental Sciences prepares students for employment in newly evolving and conventional scientific fields related to Environmental Sciences or to pursue graduate and professional degrees. Graduates are employed as Water Treatment Plant Managers, Air Pollution Supervisors, Marine Biologists, Energy & Environment Specialists, Environmental Chemists/Biologists, Oceanographers, Soil Conservationists and Fisheries Scientists.

COMMON REQUIRED COURSES¹ - CHEMISTRY OPTION

CHEM 311	CHEM488A	DNSC 400	ENVS 221
CHEM 312	CHEM 489		ENVS 222
			ENVS 403
			ENVS 405
			ENVS 460
			ENVS 497
			ENVS 498
			ENVS 499

¹Students must receive a grade of "C" or better in both lecture and lab component to progress to the next sequence course.

CURRICULUM GUIDE FOR ENVIRONMENTAL SCIENCES CHEMISTRY OPTION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101	3	ENGL 102	3
MATH 110	3	ENGL 001	0
CHEM 111	3	MATH 112	4
CHEM 113	1	CHEM 112	3
BIOL 111	3	CHEM 114	1
BIOL 113	1	BIOL 112	3
DNSC 100	<u>1</u>	BIOL 114	1
	15	EDHE 111	<u>3</u>
			18

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
CSDP 220	4	MATH 210	3
ECON 201	3	ECON 202	3
PHYS 121 <i>and</i>		ENGL 203	3
PHYS 123 <i>or</i>		PHYS 122 <i>and</i>	
PHYS 181H <i>and</i>	3	PHYS 124 <i>or</i>	
PHYS 183H	<u>1</u>	PHYS 182H <i>and</i>	3
	15	PHYS 184H	<u>1</u>
			17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 301	3	ENGL 305 <i>or</i>	
BIOL 303	1	ENGL 310	3
CHEM 311	4	ENVS 221	3
CHEM 341	3	ENVS 222	1
CHEM 343	<u>1</u>	CHEM 312	3
	12	Elective ¹	<u>3</u>
			13

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
DNSC 400	1	CHEM 488A	3
ENVS 403	3	CHEM 489	1
ENVS 405	1	ENVS 498 <i>or</i>	
ENVS 497	1	ENVS 499	3
Elective ¹	3	GEN ED CURR AREA I	3
ENVS 498 <i>or</i>		ENVS 460	<u>3</u>
ENVS 499	2		13
GEN ED CURR AREA I	<u>3</u>		
	14		

Total Credit Hours: 120

¹Students must choose a Program Elective

COMMON REQUIRED COURSES - MARINE SCIENCE OPTION¹

BIOL 201	DNSC 400	ENVS 202	ENVS 403
BIOL 202		ENVS 204	ENVS 405
BIOL 203		ENVS 221	ENVS460
BIOL 301		ENVS 222	ENVS 497
BIOL 402			ENVS 499 <i>and/or</i>
			ENVS 499

¹Students must receive a grade of “C” or better in both lecture and lab components of core and program electives to progress to the next sequence course.

CURRICULUM GUIDE FOR MARINE SCIENCE OPTION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	15		15

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 202	3	CHEM 212	3
BIOL 203	1	CHEM 214	1
CHEM 211	3	BIOL 201	4
CHEM 213	1	BIOL 301	3
ENVS 202	3	BIOL 303	1
ENVS 204	1	EDHE 111	<u>3</u>
GEN ED CURR AREA I	<u>3</u>		15
	15		

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
PHYS 121	3	PHYS 122	3
PHYS 123	1	PHYS 124	1
ENVS 221	3	GEN ED CURR AREA II	3
ENVS 222	1	ENGL 305 or	
CSDP 220	4	ENGL 310	3
ENGL 203	<u>3</u>	ENVS 498 or	
	15	ENVS 499	3
		MATH 210	<u>3</u>
			16

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
DNSC 400	1	ENVS 460	3
BIOL 402	4	Elective ¹	3
ENVS 403	3	Elective ¹	4
ENVS 405	1	ENVS 498 or	
ENVS 497	1	ENVS 499	<u>3</u>
GEN ED CURR AREA I	3		13
GEN ED CURR AREA II	<u>3</u>		
	16		

Total Credit Hours: 120

¹Students must select a Program Elective.

**DUAL DEGREE PROGRAM
ENVIRONMENTAL SCIENCE - MARINE SCIENCES OPTION**

Students enrolled at Salisbury University in the Biology Program may earn a degree in Environmental Sciences from UMES by taking 30 hours of prescribed coursework in Environmental Science at UMES. The required courses are listed below. Students are also required to take seven (7) hours of approved courses at SU.

COMMON REQUIRED COURSES

BIOL 201	DNSC 400	ENVS 202	ENVS 403
BIOL 202		ENVS 204	ENVS 405
		ENVS 221	ENVS 460
		ENVS 222	Electives ¹

COMBINED B.S.¹/M.S.² PROGRAM ENVIRONMENTAL SCIENCES

The combined four-year/five-year B.S./M.S. degree program offers two options: Environmental Chemistry and Marine Sciences. The for the two options are administered under the auspices of the undergraduate Environmental Science and the graduate Marine-Estuarine-Environmental Science (MEES) programs. The student receives the B.S. and M.S. degrees after completing the requirements for the two programs. A student wishing to pursue the 5-year M.S. program must make a formal application to the MEES program in the first semester of the Junior year. Students must take the GRE (General Test) during their junior year.

ENVIRONMENTAL CHEMISTRY OPTION

This program is designed to enable students to earn both the B.S. and M.S. degrees in five years. The curriculum is more advanced in the traditional B.S. degree program, and students become involved in directed research earlier. The curriculum for the two degrees is administered under the auspices of the undergraduate Environmental Science and the graduate Marine-Estuarine-Environmental-Science (MEES) programs. Two tracks are available, Environmental Chemistry and the Marine Science. The Environmental Chemistry track provides students with training in environmental contamination and toxicology, air and water pollution, waste treatment and disposal, and energy resources.

Students in the first two years of the program take courses to satisfy the General Education requirements, along with courses in Biology, Chemistry, Math, & Computer Sciences, and Physics. The Junior year provides training in topics specific to the field and prepares students who seek to pursue the M.S. program with prerequisites for the graduate level courses.

During the fourth year, additional courses providing advanced training in pollution and energy are offered. Majors who choose the B.S. program will graduate at the end of the fourth year with the requisite 120 credits. The 12-month period (5th year) subsequent to satisfying requirements for the B.S. degree are spent completing the M.S. requirements, including research work during the summer. For additional information, contact Chairman, Department of Natural Sciences or Director, B.S./M.S. Program in Environmental Chemistry.

DEPARTMENTAL REQUIREMENTS

Students enrolled in the Environmental Chemistry option must complete 120 semester hours of undergraduate courses and 30 semester hours graduate courses for their degrees: 42 semester hours in general education courses, 29 semester hours in undergraduate program core courses, 11 semester hours of program electives and 45 semester hours of supportive courses. To receive the M.S. degree, students must satisfy degree requirements which include a total of 30 course credits: course work (24 credits) and Master's Thesis research (6 credits).

COMMON REQUIRED COURSES

A. Undergraduate¹

CHEM 311	ENVS 221	DNSC 400
CHEM 312	ENVS 222	ENVS 603
CHEM 488A	ENVS 497	ENVS 605
CHEM 489	ENVS 498 <i>and/or</i>	ENVS 660
	ENVS 499	

B. Graduate²

MEES 608A

¹Course Requirements for completion of the B.S. Degree

²Course Requirements for completion of the M.S. Degree

CURRICULUM GUIDE B.S./M.S. ENVIRONMENTAL CHEMISTRY OPTION

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113 ¹	1	CHEM 114	1
DNSC 100	1	EDHE 111	3
ENGL 101	3	ENGL 102	3
MATH 110	<u>3</u>	ENGL 001	0
	15	MATH 112	<u>4</u>
			18

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
PHYS 121		ENGL 305 or	
PHYS 123 or		ENGL 310	3
PHYS 181H	3	MATH 210	3
PHYS 184H	1	PHYS 122 <i>and</i>	
MATH 211	4	PHYS 124 or	
CSDP 220 or	4	PHYS 182H <i>and</i>	
BUED 211	<u>3</u>	PHYS 184	<u>4</u>
	15		14

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ECON 201	3	ENGL 203	3
CHEM 311	4	ECON 202	3
BIOL 301	3	ENVS 221	3
BIOL 303	1	ENVS 222	1
GEN ED CURR AREA I	3	CHEM 312	4
ENVS 498 or		GEN ED CURR AREA I	<u>3</u>
ENVS 499	<u>3</u>		17
	17		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 341	3	ENVS 660	4
CHEM 343	1	ENVS 498 or	
CHEM 621	4	ENVS 499	3
DNSC 400	1	GEN ED CURR AREA II ¹	3
ENVS 497	1	Program Elective	<u>3</u>
ENVS 603	3		13
ENVS 605	<u>1</u>		
	14		

¹CSDP 220 may be substituted with either CSDP 121 or BUED 212, three credits each, and make up one credit somewhere else.

SUMMER SESSION

<i>First Semester</i>	<i>Credit</i>
MEES Elective	$\frac{4}{4}$

FIFTH YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
MEES Elective	4	MEES Elective	7
MATH 410 or		MEES 799	3
CSDP 604	3	ENVS 684	3
Program Elective	$\frac{3}{10}$	MEES 608	$\frac{1}{14}$

Total Credit Hours: 150

COMBINED B.S./M.S.

ENVIRONMENTAL SCIENCE - MARINE SCIENCE OPTION

Students who successfully complete this program receive a B.S. degree in Environmental Science (Marine Science Option) and an M.S. degree in Marine-Estuarine-Environmental-Science (MEES). Students are able to attain these degrees in five years by substituting MEES graduate courses for free electives, and by taking courses and conducting research during summers. Only nine credit hours are allowed to overlap and be credited towards both the BS and MS degrees. Students wishing to pursue the M.S. option must formally apply to the MEES program in the first semester of their junior year. If accepted, they may attend a summer-in-residence program at the Horn Point Environmental Laboratories in the summer following their junior year to begin directed research and take a graduate level course. In their senior year, students complete their B.S. degree requirements by taking upper level undergraduate courses and also graduate level courses towards their M.S. degree. Students have the option of being in residence at UMES or at a participating CEES campus during their senior and fifth years.

DEPARTMENTAL REQUIREMENTS

To receive the M.S. degree, students must satisfy degree requirements which include a total of 30 course credits: course work (24 credits) and Master's Thesis research (6 credits). Students must complete a total of 120 semester hours university undergraduate courses and 33 semester hours university graduate courses: 42 semester hours in general education courses, 40 semester hours in undergraduate program core courses, 38 semester hours in courses which have supportive courses and 9 semester hours in program elective courses. Students must receive a grade of "C" or better in both lecture and lab component to progress to the next sequence course.

COMMON REQUIRED COURSES

BIOL 201	ENVS 202	DNESC 400	ENVS 660
BIOL 202	ENVS 204		ENVS 603
BIOL 203	ENVS 221		MEES 608
BIOL 301	ENVS 222		
BIOL 303	ENVS 498 <i>and/or</i>		
BIOL 402	ENVS 499		

Students must choose an Area of Specialization (AOS) in the MEES Program: Ecology, Environmental Chemistry, Environmental Molecular Biology/Biotechnology, Oceanography, Fisheries Science, or Environmental Science. UMES has its greatest strengths in Ecology and Environmental Chemistry. Students must meet the requirements of their AOS. Specific information can be found in the MEES Student Guide or from the MEES Office.

AREA OF SPECIALIZATION

<u>Ecology¹</u>		
BIOL 600	BIOL 681	ENVS 660
BIOL 601	BIOL 683	
BIOL 633	BIOL 688A	
ENVS 660	BIOL 688B	

<u>Environmental Chemistry²</u>		
CHEM 621	ENVS 603	ENVS 660
CHEM 670	ENVS 603	ENVS 684
CHEM 632	ENVS 605	
	ENVS 639	
	ENVS 641	

Thesis Research

**CURRICULUM GUIDE FOR B.S./M.S. ENVIRONMENTAL SCIENCE
MARINE SCIENCE OPTION**

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
DNSC 100	1	EXSC 111 ¹	3
ENGL 101	3	ENGL 102	3
MATH 110	<u>3</u>	ENGL 001	0
	15	MATH 112	<u>4</u>
			18

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	BIOL 201	4
CHEM 213	1	CHEM 212	3
ENGL 203	3	CHEM 214	1
ENVS 202	3	ENGL 305	3
ENVS 204	1	CSDP 220 ² or	4
MATH 211	<u>4</u>	BUED 211	3
	15	GEN ED CURR AREA I	<u>3</u>
			17

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
BIOL 202	3	BIOL 301	3
BIOL 203	1	BIOL 303	1
BIOL 402	4	ENVS 221	3
ENVS 498 or		ENVS 222	1
ENVS 499	3	MATH 210	3
PHYS 121	3	PHYS 122	3
PHYS 123	1	PHYS 124	1
GEN ED CURR AREA II	<u>3</u>	GEN ED CURR AREA II	<u>3</u>
	18		18

SUMMER I

	<i>Credit</i>
ENVS 498 or	
ENVS 499	<u>4</u>
	4

¹EXSC 111 cannot be repeated for credit.

²CSDP 220 may be substituted with BUED 211, three credits, and make up one credit in another area.

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
DNSC 400	1	CSDP 604	3
ENVS 403/603	3	MEES 608	1
ENVS 405/605	1	ENVS 660	3
ENVS 497	1	Program Elective	3
Program Elective	3	GEN ED CURR AREA I	<u>3</u>
Program Elective	3		13
MEES Elective	<u>4</u>		
	16		

MASTER'S YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
MEES 608	1	MEES 799	3
MEES 799	3	MEES Elective	<u>3</u>
MEES Elective	<u>3</u>		6
	7		

Total Credit Hours: 150

PRE-PHARMACY

DEPARTMENTAL REQUIREMENTS

Pre-Pharmacy students must complete 73 semester hours of courses with a grade of "C" or better, which include a minimum of 20 hours of biology and chemistry at the 200 level or above and 8 hours of physics courses.

OBJECTIVES

The objectives of the pre pharmacy program are to:

1. Provide the prerequisite courses for admission into the pharmacy program; and,
2. Prepare students interested in the pharmacy program for the courses they will encounter in the PharmD curriculum.

CAREER OPPORTUNITIES

A PharmD degree prepares students to work in chain drug stores, corporate community setting such as a hospital pharmacy, an independent pharmacist in their own business, pharmaceutical industry, conduct research and educational institutions.

CURRICULUM FOR PRE-PHARMACY PRE-PROFESSIONAL PROGRAM

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 111	3	CHEM 112	3
CHEM 113	1	CHEM 114	1
BIOL 111	3	BIOL 112	3
BIOL 113	1	BIOL 114	1
DNSC 100	1	ENGL 102	3
ENGL 101	3	ENGL 001	0
HIST 201	3	MUSI 101	3
MATH 110	<u>3</u>	MATH 112	<u>4</u>
	18		18

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
CHEM 211	3	CHEM 212	3
CHEM 213	1	CHEM 214	1
BIOL 231	3	BIOL 232	3
BIOL 233	1	BIOL 234	1
PHYS 121	3	PHYS 122	3
PHYS 123	1	PHYS 124	1
PSYC 200	3	BIOL 301	3
SOCI 101	<u>3</u>	BIOL 303	1
	18	ENGL 203	<u>3</u>
			19

Total Credit Hours: 73

MINOR PROGRAMS

BIOLOGY

The Minor Program in Biology is designed to provide supportive instruction for biology and mathematics majors. Students must complete 20 credit hours for a minor. Courses in Biology that are used to satisfy requirements for science majors may not count towards the minor curriculum. In addition to the curriculum for Non-Science majors, students must select any three (3) additional courses from the Biology Program Electives.

BIOL 111	BIOL 112	Program Electives ¹
BIOL 113	BIOL 114	

CHEMISTRY

The Minor Program in Chemistry is designed to provide supportive instruction for biology and mathematics majors. Students must complete 20 credit hours for a minor. Chemistry courses used to satisfy requirements for science majors may not be used for the Minor curriculum. Courses for a Minor in Chemistry for Non-Science majors include:

CHEM 111	CHEM 211	CHEM ¹
CHEM 112	CHEM 212	
CHEM 113	CHEM 213	
CHEM 114	CHEM 214	

ENVIRONMENTAL SCIENCES

The Minor program in Environmental Sciences is designed to provide supportive instruction for Biology, Chemistry and Physics. Courses that are used to satisfy requirements for science majors may not count towards the minor curriculum. Students must select three (3) additional courses from the Biology Program Electives for a total of eight (8) credits.

BIOL 402	ENVS 202	ENVS 221
	ENVS 204	ENVS 222
Program Elective ³		

PHYSICS

The Minor program in Physics is designed to provide supportive instruction for Biology, Chemistry, Environmental Science, Mathematics and Computer Science majors. The program also provides courses for preparing students for secondary school science teaching. Courses in Physics that are used to satisfy requirements for science majors may not be used for minor curriculum. Students must select any other physics courses above the 200 level (PHYS 498, 499 are recommended) for a total of two (2) credits. Courses for minor in physics include:

PHYS 161/181H	PHYS 262/182H	PHYS 283
PHYS 163/183H	PHYS 264/184H	PHYS 423
	PHYS 263	PHYS ⁴
	PHYS 265	

¹Student must select three courses to satisfy this requirement for a total of twelve (12) credits.

²Select one additional course at or above 300 level in Chemistry.

³Student must select three additional courses from the Biology Program Electives for a total of eight (8) credits.

⁴Student may select any other courses above the 200 level to satisfy this course for a total of two (2) credits.

COURSE DESCRIPTION IN BIOLOGY¹

- BIOL 101 Theories and Applications of Biological Sciences/Online Credit 3**
This course provides an introduction to Biological principles as they apply to our daily lives. The course is designed to partially meet general education requirements in the Natural Sciences. Consideration is given to organisms, their components and activities. Emphasis is on the development and use of knowledge, skills and attitudes expected to be of value in future decision-making as it relates to Biology, our present environmental conditions, and problems facing each of us today. This course is comprised of three hours lecture per week.
- BIOL 103 Biological Science Laboratory Credit 3**
This course emphasizes student involvement in investigations related to Biology. Emphasis is placed on the scientific method, biological molecules, cellular respiration and dissection. Laboratory is designed to partially meet general education requirements in Natural Sciences. Prerequisite: One year of high school biology. The laboratory fee is \$25.
- BIOL 111 Principles of Biology I/ Honors Credit 3**
This course is an introduction to the basic concepts of biology, with emphasis on molecular, cellular and genetic concepts related to living organisms. Basic concepts are considered, and major topics deal with (1) organization of cells and the molecular basis of life, (2) energetics and metabolism, (3) cell growth and reproduction, and (4) genetics. This course is for Natural Sciences majors and others in the related sciences. Co-requisite: BIOL 113/113H. This course is comprised of three hours per week and one-hour discussion for the Honors section only.
- BIOL 112 Principles of Biology II/ Honors Credit 3**
This course is an introduction to the basic concepts of biology with emphasis on structure and function, focusing on adaptations of plants and animals. Representative animal systems are discussed and contrasted with representative plant systems. Included in the course is the study of the animal physiology and plant physiology. Prerequisites: BIOL 111/111H (grade of C or better). This course is comprised of three hours of lecture per week.
- BIOL 113 Principles of Biology I Lab/Honors Credit 1**
This laboratory course is designed to accompany BIOL 111/111H and to reinforce the basic biological concepts of cellular biology, molecular biology, and Mendelian and molecular genetics discussed in the corresponding lecture. Supervised laboratory sessions enhance the student's skills in experimental manipulation, data collection, data interpretation and analysis, and data presentation in an effort to stimulate logical thinking and scientific reasoning. Co-requisites: BIOL 111/111H (grade of C or better). The laboratory fee associated with this course is \$25.00.
- BIOL 114 Principles of Biology II Lab/Honors Credit 1**
This laboratory course is designed to accompany BIOL 112/112H. Laboratory gives consideration to biological concepts related to the physiological mechanisms of living organisms both plants and animals. Selected systems are studied in a functional perspective. Emphasis is placed on experimental manipulation, data collection, data interpretation and analysis, and data presentation. Co-requisites: BIOL 112/112H (grade of C or higher). The laboratory fee associated with this course is \$25.00.
- BIOL 201 Marine Zoology Credit 4**
This course is a study of the nature of life in the sea, adaptations, patterns of distribution and production of plankton, nekton and benthos, and their interrelationships. The course is comprised of two hours of lecture and a three-hour laboratory per week. Prerequisite: BIOL 111/111H. Laboratory Fee: \$25.00
- BIOL 202 Marine Botany Credit 3**
This course is designed for both environmental science and biology majors. The course focuses on the environmental and ecological aspects of marine and estuarine plants and includes discussions of systematics and the ecology of micro and macro algae, marine fungi, and vascular plants. The various aspects of the Chesapeake Bay watershed are discussed. Field trips to various marine environments are conducted during the semester for which attendance is mandatory. Prerequisite for this course includes: BIOL 112/112H (grade of C or higher). Co-requisite: BIOL 203. Students must be enrolled in BIOL 202 and BIOL 203 during the same semester. This course is comprised of three hours of lecture per week.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology.

BIOL 203 Marine Botany Laboratory**Credit 1**

This four-hour/week laboratory course is designed to introduce the student to marine plants in the pelagic open-ocean and coastal environments. This class focuses on both phytoplankton and benthic marine plant communities and introduces field and laboratory techniques for research on the biology and ecology of marine plants. These include micro- and macro-algal identification, the determination of algal primary productivity and growth rates, and field sampling techniques in marine plant ecology. A service learning project is required as part of the laboratory grade. Co-requisite: BIOL 202. Students must be enrolled in BIOL 202 and BIOL 203 during the same semester. This course is comprised of four hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 211 Principles of Biology III**Credit 3**

This course is an introduction to the principles of Biology with emphasis on biodiversity, evolution, and ecology. The course focuses on (1) biodiversity within five kingdom systems, (2) principles of evolution, and (3) population and community ecology with applications to environmental issues. Principles of Biology I is intended for the Biology major and persons in the related sciences. Prerequisite: BIOL 111/111H (grade of C or higher). The course is comprised of three hours of lecture per week.

BIOL 213 Principles of Biology III Laboratory**Credit 1**

The laboratory activities of this course are related to principles of Biology with emphasis on biodiversity, evolution, and ecology. Topics of discussion include a survey of the five kingdoms, experimental tests of evolution and ecological concepts. This course is intended for the Biology major and persons in the related sciences. Prerequisite: BIOL 111/111H (grade of C or higher). Co-requisite: BIOL 211. This course is comprised of one three-hour laboratory per week. The Laboratory fee associated with this course is \$25.00.

BIOL 222 Genetics**Credit 3**

Basic principles governing transmission of traits from generation to generation in humans are covered in this course. Course material focuses on the structure and functions of DNA, RNA, proteins and chromosomes in eukaryotes, the mode of transmission of genes to the next generation, how genes are damaged and repaired, use of recombinant DNA technology as a treatment option, and the consequences of mutations and chromosomal abnormalities in producing human disorders. Lectures also include discussions on determinations of gene and allele frequencies in populations and how they affect evolution. Prerequisite: BIOL 111/111H (grade of C or higher). This course is comprised of three hours lecture per week.

BIOL 223 Genetics Laboratory**Credit 1**

This course is designed to introduce students to experimental approaches to studying problems in molecular genetics. Upon completion of the course, students should have a working knowledge of how problems pertaining to hereditary disorders are addressed. Students are taught techniques of how to extract DNA and protein, how to analyze these molecules by electrophoresis, spectrophotometry, polymerase chain reaction, and mammalian cell culture. Prerequisites: BIOL 111/111H; and BIOL 113/113H. This course is comprised of three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 231 Human Anatomy and Physiology I**Credit 3**

This course provides an introduction to the structure and function of the human body. Topics included are chemistry and the cell, integument, skeletal, muscular and nervous systems. Prerequisites: BIOL 111/113, BIOL 112/114, BIOL 188) or for allied health program students (grade of C or higher). This course may not be used as a Biology Program Elective for credit toward the Biology major. This course is comprised of three hours of lecture per week.

BIOL 232 Human Anatomy and Physiology II**Credit 3**

This course provides discussion of the respiratory, circulatory, excretory, endocrine, digestive, and reproductive functions of the human body. Pre-requisites: BIOL 231/233. This course may not be used as a Biology Program Elective for credit toward the Biology major. This course is comprised of three hours of laboratory per week.

BIOL 233 Human Anatomy and Physiology Lab I**Credit 1**

This course accompanies BIOL 231 and emphasizes student involvement in investigations related to human anatomy and physiology. The course provides practical experience with subject matter and includes written as well as practical examinations. Prerequisites: Biology 111/113. This course is comprised of two hours of laboratory per week. This course must be taken concurrently with BIOL 231. The laboratory fee associated with this course is \$25.00.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology.

BIOL 234 Human Anatomy and Physiology Lab II**Credit 1**

This course complements the BIOL 232 course and emphasizes student involvement in investigations related to human anatomy and physiology. The course is designed to provide practical experience with subject matter and includes written as well as practical examinations. Pre-requisites: BIOL 231 and BIOL 233 or equivalent. Co-requisite: BIOL 232. The laboratory fee associated with this course is \$25.00.

BIOL 261 Invertebrate Zoology**Credit 4**

This course is presented as a survey of invertebrate animals with emphasis on the relationship between structure and function and evolution of major groups. Life history, strategies, and behaviors are major topics of discussion. Laboratory emphasis is on examination of animals. Pre-requisites: BIOL 111/111H (grade of C or higher) or consent of the instructor. This course is comprised of two hours of lecture and two two-hour laboratories per week. The laboratory fee associated with this course is \$25.00.

BIOL 301 Microbiology**Credit 3**

This course examines the basic life processes of various microscopic organisms and their relevance to humans, focusing on pathogenicity. Discussion also encompasses chemotherapy and the immune response to infection. The course provides an introduction to the study of microorganisms and their diversity, growth, life cycle, physiology and control. The role of microorganisms in diseases, the environment and industry, as well as other economic considerations. Prerequisites: BIOL112/BIOL112H or equivalent (grade of C or better); one year of Chemistry, or permission of the instructor. This course is comprised of three hours of lecture per week.

BIOL 303 Microbiology Laboratory**Credit 1**

This course is designed to expose students to laboratory activities that will acquaint them with procedures for the proper and safe handling of microorganisms to facilitate investigations using microorganisms. Co-requisite: BIOL 301. This course is comprised of two two-hour laboratory sessions per week. The laboratory fee associated with this course is \$25.00.

BIOL 311 Vertebrate Embryology/Honors**Credit 4**

This course provides the student with a study of the development of the vertebrate body as exemplified by early development of pre-chordate, early chordate, amphibians, birds and mammalian embryos. The course offers the student a descriptive study of the normal morphology of the fundamental morphological aspects of development. In addition, to increase the student's understanding of the mechanisms underlying the development of form to function, experimental, molecular, and genetic approaches are studied. Pre-requisites: BIOL 111/111H (grade of C or higher). This course is comprised of three hours of lecture and three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 322 Comparative Vertebrate Anatomy**Credit 4**

This course is a study of the general features of chordate development, and a comparative study of the anatomy of the vertebrate classes. Evolution is the unifying theme. This course serves the need of students intending to pursue careers in medicine, biology, biomedical science and environmental science. Prerequisites for this course include: BIOL 111/111H (grade of C or higher) and BIOL112/112H (grade of C or higher). This course is comprised of two hours of lecture and four hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 326 Cell Biology**Credit 3**

Course material of cell biology focuses on understanding the roles of nucleic acids, lipids, proteins and carbohydrates in development and maintenance of eukaryotic organelles and cells. Discussions will target processes in each major organelle including the nucleus, plasma membrane, smoother and rough endoplasmic reticulum, Golgi, lysosomes, cytoplasm, and mitochondria. Students learn how events such as ADP ribosylation, methylation, phosphorylation/dephosphorylation and cleavage of polypeptides influence the activities of proteins and enzymes. Other topics include enzyme kinetics and inhibition, how mutations in DNA are produced and corrected, recombinant DNA technology, cloning, the cell cycle, and cancer. Prerequisites: BIOL 111/111H (grade of C or higher) and BIOL 222 (grade of C or higher). This course is comprised of three hours of lecture per week.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology.

BIOL 327 Cell Biology Laboratory**Credit 1**

This course is designed to familiarize students to experimental approaches to studying problems in cell and molecular biology. Upon completion of the course, students should be able to participate in research projects aimed at studying molecular and cellular processes. Students are taught techniques of how to study DNA, RNA, and protein using computer databases and existing software, how to extract these molecules from cells and tissues, analyze them, and utilize them in subsequent studies such as the polymerase chain reaction, restriction enzyme analysis, SDS-PAGE, and Western Blot. Prerequisites: BIOL 111 (grade of C or higher), BIOL 113 (grade of C or higher), BIOL 222 (grade of C or higher), and BIOL 223 (grade of C or higher). The laboratory fee associated with this course is \$25.00.

BIOL 330 Evolution**Credit 3**

This course is an advanced exploration of the evolutionary perspective on Biology, including genetic and ecological aspects of evolutionary processes. Topics of discussion focus on the mechanisms of evolutionary change, adaptation, and the history of living organisms. Examples of evolutionary principles in medicine and environmental science are explored to relate concepts to practical application. Prerequisites: BIOL 111/111H (grade of C or higher), BIOL 211, and BIOL 222. This course is comprised of three hours of lecture per week.

BIOL 335 Biogeography**Credit 3**

Exploration of the environmental factors and historical perspectives that explain distributions of organisms are strongly emphasized in this course. Focus is placed on mechanisms of distribution, environmental constraints and phylogenetic perspectives. Prerequisites: BIOL 111/111H (grade of C or higher); and BIOL 211. This course is comprised of three hours of lecture per week.

BIOL 341 Introductory Physiology**Credit 4**

An examination of the mechanisms involved in control of body functions. Basic chemical and physical principles of animal function will be discussed. Prerequisites: BIOL 111/113, BIOL 112/114, BIOL 211/213 (grade of C or higher), and one year of Chemistry and a course in vertebrate anatomy. Three hours of lecture per week and three laboratory hours per week. The laboratory fee associated with this course is \$25.00.

BIOL 361 Animal Behavior**Credit 4**

This course investigates the concepts and applications of animal behavior, with emphasis on the evolutionary basis of behavior. Topics include both proximate influences on behavior and adaptive perspectives on reproductive and social behavior. The laboratory component of this course includes bench work and fieldwork to illustrate specific concepts. Prerequisites: BIOL 111/111H (grade of C or higher), and BIOL 112/112H (grade of C or higher) and BIOL 211/213 is recommended. This course is comprised of two hours of lecture per week, three hours of laboratory, and one hour of discussion per week. The laboratory fee associated with this course is \$25.00.

BIOL 402 Ecology**Credit 4**

This course is designed to provide the student with a study of the basic interrelations of plants and animals with physical and biotic factors of the environment. Prerequisites: BIOL 111/111H (grade of C or higher), and BIOL 112/112H (grade of C or higher). BIOL 211/213 is recommended. This course is comprised of two hours of lecture, one hour of discussion, and three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 404 Conservation Biology**Credit 3**

This course provides an introduction to the principles of conservation biology. Topics of discussion emphasize the application of ecological principles, management tools, and case history studies related to conservation issues. Prerequisites: BIOL 402 or equivalent.

BIOL 420 Animal Histology**Credit 3**

This course is a study of the microscopic structure of vertebrate tissues and organs. Functional correlates are discussed. Prerequisites: BIOL 111/113, BIOL 112/114, BIOL 211/213 (grade C or better) a course in vertebrate anatomy and consent of the instructor. This course is comprised of three hours of lecture per week.

BIOL 421 Animal Histology Laboratory**Credit 1**

This course is designed to accompany BIOL 420 and provides hands-on experience using the light microscope to examine vertebrate tissues discussed in lecture. Co-requisites for this course is BIOL 420. BIOL 421 must be taken concurrently. The laboratory fee associated with this course is \$25.00.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology.

BIOL 426M Biotechnology Credit 4

This course studies the basic principles of biotechnology and its applications to areas such as medicine, agriculture, and the industry. Emphasis is placed on recombinant DNA technology (gene cloning), metabolites of proteins, and animal and plant biotechnology. The weekly three-hour laboratory component of this course exposes students to various laboratory techniques employed in: gene cloning, cultivation components, sterile tissue culture, and study of cell-surface molecules. In addition to the scheduled three-hour component of this course, additional unscheduled time is required to complete assignments. Unscheduled time is dependent on specific techniques employed. This course is reserved primarily for advanced undergraduate students in the MARC Program. Prerequisites: BIOL 222 (grade of C or higher), BIOL 326 and CHEM 342/342H/342M. Co-requisites: CHEM 342/342H/342M. The laboratory fee associated with this course is \$25.00.

BIOL 431 Mammalogy Credit 4

This course provides a detailed investigation of mammalian biology, with emphasis on special physiological and ecological adaptations within the group. Topics of discussion include classification, physiological adaptations, ecological specializations and biogeography of mammals. Prerequisites: BIOL 111/111H (grade of C or higher) and BIOL 211, or permission of the instructor. This course is comprised of three hours of lecture and three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 432 Herpetology Credit 3

This course is a concentrated study of the ecology, behavior, and physiological characteristics of amphibians and reptiles. Topics of discussion include classification, adaptations and diversity of groups within the two vertebrate classes. Prerequisites: BIOL 111/111H (grade of C or higher), and BIOL 112/112H (grade of C or higher). This course is comprised of three hours of lecture per week.

BIOL 436 General Endocrinology Credit 3

This course provides discussions of the importance of hormones in regulating body functions, integrating biological systems, protecting the body against stress and various diseases, and maintaining day-to-day life processes. The course also emphasizes a review of concepts relative to mechanisms of hormone action. Consideration is given to classic endocrine case studies. Prerequisites for this course include: BIOL 111/111H (grade of C or better). A course in Cell Biology is recommended. This course is comprised of three hours of lecture per week.

BIOL 441 Comparative Physiology Credit 4

This course is a study of the major functional adaptations in animal systems providing for maintenance of homeostasis. The function of vertebrate and invertebrate systems is discussed. Prerequisites: BIOL 341, and CHEM 341, or permission of the instructor. This course is comprised of three hours of lecture and three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 462 General Parasitology Credit 4

The identification of parasites common to man and domesticated animals is the primary focus of this course. Epidemiological aspects of zoonotic diseases are discussed. Other subjects to be covered are host habitats, vectors, types of hosts, and transmission methods, life cycles, and control and prevention measures. Prerequisites: BIOL 111/111H (grade of C or higher); and BIOL 112/112H (grade of C or higher); or consent of the instructor. A course in Invertebrate Zoology is recommended. This course is comprised of three hours of lecture and one four-hour laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 463 Wildlife Management Credit 4

In this course, students develop an understanding of the theories, principles, and practices associated with wildlife management. Emphasis is placed on research design, sampling techniques, and field methodologies. Students gain theoretical knowledge and applied management techniques to work as professional wildlife biologists in natural resource professions. All terrestrial vertebrate taxonomic groups are addressed, including mammals, birds, amphibians, and reptiles. Graduate students are required to complete one additional research paper approved by the professor. Prerequisites: BIOL 111/111H (grade of C or higher), or permission of the instructor. The laboratory fee associated with this course is \$25.00.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology.

BIOL 464 Medical and Veterinary Entomology Credit 4
This course provides a study of the arthropod (especially insects) species that are an economically important pest, and vectors of diseases of man and domesticated animals. Epidemiological aspects of zoonotic diseases are discussed. Prerequisites: BIOL 111/111H (grade of C or better), and BIOL112/112H (grade of C or better), or BIOL 261, or consent of the instructor. This course is comprised of three hours lecture and one four-hour laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 466 Medical Parasitology Credit 3
This course provides students in the biological, agricultural, and medical sciences with the knowledge necessary to know and identify metazoan parasites common to all organisms including man and his domesticated animals. Detailed information on how to recognize and diagnose parasitic diseases, infections, histopathology, and infestations is discussed. Epidemiological aspects of zoonotic diseases are discussed, including detailed information on host habitats, vectors, types of hosts, and transmission. Life cycles, control measures, disease prevention, treatment, and location of parasites in relation to the hosts are considered. Prerequisites: BIOL 111/111H (grade of C or higher). This course is comprised of three hours of lecture per week.

BIOL 497 Biology Seminar/ Honors/MARC Credit 1
This course focuses on the discussion of various topics in biology, with the contents varied each semester. Student presentations are required. The BIOL 497M section is reserved for students in the MARC Program. Prerequisite: Senior level classification. This course is comprised of one hour of lecture per week.

BIOL 498 Independent Study Credit 1-3
This course focuses on readings of significant publications in selected subjects and discussions with a Biology faculty member. The course is designed to enhance the student's knowledge base of a subject area related to the biological sciences. Credits and hours are by arrangement. Prerequisites: Junior or Senior level classification and permission of the instructor.

BIOL 499 Undergraduate Research Credit 1-4
This course is designed for the undergraduate student who has an interest in pursuing a special problem as an independent research project. Credits and hours are by arrangement. Prerequisites: Junior and Senior level classification and permission of instructor.

CHEMISTRY¹

CHEM 101 General Chemistry I/Online Credit 3
This course provides an introduction to inorganic chemistry and includes lectures on matter, dimensional analysis, elements (nomenclature, atomic structure, atomic formula and atomic orbital), compounds (nomenclature, molecular bonding, molecular structure, and molecular formulas), molecular conversions, solutions, acids, bases, and gases. This course satisfies General Education Requirements Area III (Biological and Physical Sciences). This course is recommended for the non-science major, pre-health professionals (including pre-nursing students and nutrition majors), agriculture and home economics majors. Note: Students requiring a lab-based course must also register for CHEM 103. Prerequisite or Co-requisite: MATH 101 or equivalent.

CHEM 102 General Chemistry II/Online Credit 3
This course provides an introduction to organic and biological chemistry and includes lectures on carbon chemistry, organic nomenclature, basic organic reactions, saccharides, amino acids, proteins, and DNA. This course satisfies General Education Requirements Area III (Biological and Physical Sciences). This course is recommended for the non-science major, pre-health professionals (including nursing students and nutrition majors), agriculture, and home economists majors. Note: Students requiring a lab-based course must also register for CHEM 104. Prerequisite or Co-requisite: CHEM 101 or equivalent.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Biology and Chemistry

CHEM 103¹ General Chemistry Laboratory I Credit 1
This two-hour per week laboratory includes experiments that illustrate the basic principles discussed in General Chemistry I. This course satisfies the laboratory component for General Education Requirements Area III (Biological and Physical Sciences Lab). This course is recommended for the non-science major, pre-health professionals, (including pre-nursing students and nutrition majors), agriculture and home economics majors. Prerequisite or Co-requisite: CHEM 101. Laboratory Fee: \$25.00

CHEM 104 General Chemistry Laboratory II Credit 1
This two-hour per week laboratory includes experiments that illustrate the basic principles discussed in General Chemistry II. This course satisfies the laboratory for General Education Requirements Area III (Biological and Physical Sciences Lab). This course is recommended for the non-science major, pre-health professionals (including nursing students and nutrition majors), agriculture and home economics majors. Pre-requisite or Co-requisite: CHEM 102. Laboratory Fee: \$25.00

CHEM 111 Principles of Chemistry I/ Honors Credit 3
This course deals with the basic concepts in chemistry (the study of the changes in matter and energy). The student learns logical problem-solving skills, including strategies to attack complicated problems by using a step-by-step procedure. The concepts studied in this course include density, basic atomic and molecular theory, chemical nomenclature, reaction stoichiometry, and the gas laws. The course is intended for science majors. Prerequisite: High School Chemistry or CHEM 101. Pre or Co-requisite MATH 109. Co-requisite: CHEM 113/113H or consent of instructor.

CHEM 112 Principles of Chemistry II/ Honors Credit 3
This course explores more advanced topics in chemistry, building on the concepts covered in CHEM 111/111H. The concepts studied in this course will include VSPER theory, intermolecular forces, properties of liquids and solids, chemical kinetics, chemical equilibrium, acid/base chemistry and electrochemistry. The course is intended for science majors. Prerequisite: CHEM 111/113, CHEM 111H/113H. Co-requisite: CHEM 114/CHEM 114 or consent of instructor.

CHEM 113 Principles of Chemistry Lab I/ Honors Credit 1
This course is the laboratory companion to CHEM 111/111H. It is designed to deepen the students' understanding of topics discussed in the lecture, increase their skill with common laboratory equipment, and indoctrinate them in proper chemical safety practices. The students will learn to perform a valid experiment in a safe manner, to observe and record any data acquired, and interpret the data using various equations and graphs. Laboratory skills such as filtration, titration, and the accurate measurement of masses and volumes will be developed. The lab period will be a three-hour session. Prerequisite or Co-requisite CHEM 111/111H or consent of instructor. Laboratory Fee: \$25.00

CHEM 114 Principles of Chemistry Lab II/Honors Credit 1
This course is the laboratory companion to CHEM 112/112H. It is designed to deepen the students' understanding of topics discussed in the lecture, increase their skill with common laboratory equipment, and indoctrinate them in proper chemical safety practices. The students will learn to perform a valid experiment in a safe manner, to observe and record any data acquired, and interpret the data using various equations and graphs. Laboratory skills such as spectroscopic measurement, pH measurement, and qualitative analysis will be developed. The lab period will be a three-hour session. Pre or Co-requisite CHEM 112/112H or consent of instructor. Laboratory Fee: \$25.00

CHEM 211 Fundamentals of Organic I/ Honors Credit 3
Topics presented in this course include molecular structure, isomerism, and stereochemistry. The chemistry of alkanes, alcohols, ethers, alkenes, and aromatic hydrocarbons will also be discussed. Interpretation of spectra of major functional classes will be explained. Three hours of lecture, a one-hour discussion, and one three-hour lab (see below) must be taken concurrently. Prerequisite: The successful completion of CHEM 111/111H and CHEM 112/112H. Pre or Co-requisite: CHEM 213/213H or consent of instructor.

CHEM 213 Fundamentals of Organic Chemistry I Lab/Honors Credit 1
This is the laboratory part of CHEM 211/211H. This course covers the practical application of theory presented in the lecture. Laboratory record keeping, neatness, laboratory notebooks, manipulation of common laboratory glassware, and safe practice and handling of chemicals will be stressed. Analysis of preparations by UV-Vis, FTIR, NMR etc., will be done. Careful recording of laboratory data and its interpretation will be covered. The lab period will be a three-hour session. Pre or Co-requisite: CHEM 211/211H or consent of instructor. Laboratory Fee: \$25.00

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Chemistry.

CHEM 212¹ Fundamentals of Organic Chemistry II/Honors Credit 3
This course is a continuation of CHEM 211/211H. Preparation and functional group reactions of carboxylic acids and their derivatives, aldehydes, carbanions, amines, polycyclic and heterocyclic aromatics, and macromolecules will be presented. Three hours of lecture, a one-hour discussion, and a three-hour laboratory (see below) must be taken concurrently. Prerequisite: successful completion of CHEM 211/CHEM 211H. Pre or Co-requisite: CHEM 214/CHEM 214H or consent of instructor.

CHEM 214 Fundamentals of Organic Chemistry Lab II/Honors Credit 1
This course is the laboratory part of CHEM 212/212H. The course is designed to refine the skills of safe practice and effective handling of chemicals and common laboratory equipment presented in CHEM 213. Spectroscopic analysis, laboratory data keeping and interpretation skills acquired in the previous laboratory course will be extended. The lab period will be a three-hour session. Prerequisites: CHEM 211/211H, 213/213H. Co-requisite: CHEM 212/212H or consent of instructor. Laboratory Fee: \$25.00

CHEM 311 Analytical Chemistry I Credit 4
This is a general course in quantitative analysis, including gravimetric, volumetric and instrumental analysis. The emphasis is placed on the understanding of the reaction stoichiometry involved for the various methods. Statistical analysis using spreadsheet programs is also introduced. The course consists of three hours of lecture and one three-hour laboratory period per week. Prerequisites: CHEM 112/112H and CHEM 212/212H or consent of instructor. Laboratory Fee: \$25.00

CHEM 312 Analytical Chemistry II Credit 4
This is a continuation of the quantitative analysis begun in CHEM 311. Analytical methods based on electrochemistry such as potentiometry will be explored. An introduction to some modern analytical techniques and instrumentation is also presented. This introduction includes uv-visible spectroscopy as well as infrared spectroscopy. Separation methods such as gas chromatography and high performance liquid chromatography are also introduced. The course consists of three hours of lecture and one three-hour laboratory per week. Prerequisites: CHEM 311, CHEM 112/112H and CHEM 212/212H or consent of instructor. Laboratory Fee: \$25.00

CHEM 331 Elementary Organic Chemistry Credit 4
This is a short course in the elementary principles of organic chemistry. This course is primarily intended for education, human ecology, and agriculture majors. It is not recommended for chemistry majors. The course consists of three hours lecture and one three-hour laboratory per week. Prerequisites: CHEM 101 and CHEM 102 or consent of instructor. Laboratory Fee: \$25.00

CHEM 332 Biochemistry Credit 4
This course is a survey of the chemical properties of compounds of biological significance, integrated with the study of fundamental metabolic and genetic processes at the molecular level. Three hours lecture and three hours laboratory per week. Prerequisite: CHEM 211 or CHEM 331 or consent of instructor. Laboratory Fee: \$25.00

CHEM 341 Biochemistry I Credit 3
This course is a study of the physical and chemical properties of the four major biomolecules: carbohydrates, lipids, proteins, enzymes, and nucleic acid. The course includes an introduction to intermediary metabolic pathways and their involvement in the generation and use of energy. The student will learn how to incorporate basic chemical principles to the biological function of organisms. This course consists of three hours of lecture per week. Prerequisite: Passing CHEM 211/211H, 212/212H with a letter grade of C or better. Co-requisite: CHEM 343 or consent of instructor.

CHEM 341H Honors Biochemistry Credit 3
This course is more an intense study of the physical and chemical properties of the four major biomolecules: carbohydrates, lipids, proteins, enzymes, and nucleic acid. The course includes an introduction to intermediary metabolic pathways and their involvement in the generation and use of energy. The student will learn how to incorporate basic chemical principles with the biological function of organisms. This course consists of three hours of lecture per week. Prerequisite: passing of CHEM 211/211H, 212/212H with a letter grade of C or better. Co-requisite: CHEM 343H or consent of instructor.

CHEM 342 Biochemistry II Credit 3
This course is a continuation of CHEM 341. It is a more intense study of the detail of biochemical processes which include energy yielding metabolic pathways, the copying, transfer and decoding of genetic information, the regulation of gene expression and recombinant DNA techniques. This course consists of three hours of lecture per week. Prerequisite: Passing of CHEM 341/341H with a letter grade of C or better. Co-requisite: CHEM 344 or consent of instructor.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Chemistry.

CHEM 342H¹ Honors Biochemistry II Credit 3
This course is a continuation of CHEM 341H. Students will focus on the detail of biochemical processes which include energy yielding metabolic pathways, the copying, transfer and decoding of genetic information, the regulation of gene expression and recombinant DNA techniques. This course consists of three hours of lecture per week. Prerequisite: Passing of CHEM 341H with a letter grade of C or better. Co-requisite: CHEM 344H or consent of instructor.

CHEM 343 Biochemistry Laboratory I Credit 1
This is the co-requisite/laboratory part of CHEM 341. This laboratory includes three hours of work per week on experiments that expose students to methods covering isolation and characterization of biomolecules. Co-requisite: CHEM 341 or consent of instructor. Laboratory Fee: \$25.00

CHEM 343H Honors Biochemistry Laboratory I Credit 1
This is the co-requisite/laboratory part of CHEM 341H. This laboratory includes three hours of work per week on experiments that expose students to methods covering isolation and characterization of biomolecules. Students are required to perform literature searches. Co-requisite: CHEM 341H or consent of instructor. Laboratory Fee: \$25.00

CHEM 344 Biochemistry Laboratory II Credit 1
This is the co-requisite/laboratory part of CHEM 342. This laboratory includes three hours of work per week in experiments that expose students to methods covering isolation and characterization of biomolecules. Co-requisite CHEM 342 or consent of instructor. Laboratory Fee: \$25.00

CHEM 344H Honors Biochemistry Laboratory II Credit 1
This is the co-requisite/laboratory part of CHEM 342H. This laboratory includes three hours of work per week on experiments that expose students to methods covering isolation and characterization of biomolecules. Students are required to perform literature searches. Co-requisite CHEM 342H or consent of instructor. Laboratory Fee: \$25.00

CHEM 401 Principles of Physical Chemistry I Credit 4
This course covers the laws of thermodynamics with emphasis on their application to chemical systems. Topics covered include: thermochemistry, equation of state, physical and chemical equilibrium and electrochemistry. The course consists of three hours of lecture and one three-hour laboratory period per week. Prerequisites: CHEM 112/112H. Co-requisites: PHYS 161/181H, PHYS262/182H, MATH 211 or consent of instructor Laboratory Fee: \$25.00

CHEM 402 Principles of Physical Chemistry II Credit 4
This course is the continuation of CHEM 401. The course will cover molecular structure and bonding, interpretation of spectra, elementary quantum and statistical mechanics, kinetic, theory of gases, chemical kinetics and the theory or rate processes. The course consists of three hours of lecture and one three-hour laboratory period per week. Prerequisite: CHEM 401 or consent of instructor. Laboratory Fee: \$25.00

CHEM 420 Advanced Inorganic Chemistry Credit 4
This course builds upon introductory courses that cover elementary principles of chemical bonding and structure, thermodynamics, kinetics and descriptive chemistry of the elements. This course consists of three hours of lecture and one three-hour laboratory period per week. Prerequisites: CHEM112/112H, CHEM114/114H or permission of the instructor. Laboratory Fee: \$25.00

CHEM 421 Instrumental Analysis Credit 4
This course is an introduction to the various instruments in current use in analytical laboratories. The course is designed to afford the student an opportunity to develop an appreciation of the fundamental functions and importance of specialized instruments. The principles underlying their construction are gained through the performance of selected experiments. The methods studied in this course include uv-visible spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectroscopy, gas chromatography-mass spectrometry, and thermogravimetric analysis. This course consists of three hours of lecture and three hours of laboratory per week. Prerequisite: CHEM 112/112H, CHEM 311 or consent of instructor. Laboratory Fee: \$25.00

²A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Chemistry.

CHEM 422M Bio-Inorganic Chemistry MARC**Credit 3**

This course deals with the functions of metallic elements in biology. Consequently the roles of metal ions and a variety of non-metals in crucial life processes will be discussed. The course, which is interdisciplinary in nature, is intended for pre-medical biology and chemistry majors and those who aspire to become researchers in the bio-medical field. It will also serve the needs of final year undergraduates in inorganic chemistry, as coordination chemistry will be emphasized. Prerequisites: CHEM 212/212H, CHEM 214/214H, CHEM 341/341H, BIOL 326 or permission of the instructor.

CHEM 488A/621 Advanced Environmental Chemistry**Credit 4**

This course is a study of the origin, transport and effects of atmospheric and aquatic pollutants with emphasis on energy-related pollutants including coal, oil and synthetic fuels. The material is divided into a study of source, fate, distribution and toxicity of inorganic and organic substances of current environmental interest. The subject matter is divided into inorganic course material consisting of metals, nutrients, greenhouse gases, and vehicular emissions and organic chemical content including pesticides and petroleum hydrocarbon source material and products. The course consists of three hours of lecture and one three hour laboratory period per week. The laboratory includes gas chromatography, gas chromatography-mass spectrometry and high performance liquid chromatography experiments to supplement class discussion. Prerequisites: CHEM 112/112H, CHEM 211/211H and CHEM 311 or permission of the instructor. Laboratory Fee: \$25.00

CHEM 497 Chemistry Seminar/Honors/MARC**Credit 1**

This course focuses on current issues in the chemical field. Student participation is required. Both oral and written presentations will be required. Prerequisite: CHEM 112/112H or consent of instructor.

CHEM 498 Independent Study**Credit 3**

The hours for this course are by arrangement with the individual instructor. This course will explore current and historic chemical topics and projects. It will also cover chemical information retrieval. Written presentations will be required. Oral presentation will be encouraged. Students should finish a contract with instructor during the first week of the class. Prerequisite: CHEM 112/112H and consent of instructor.

CHEM 499 Undergraduate Research**Credit 3-4**

The hours for this course are by arrangement with the individual instructor. The student will be exposed to research methodology and have an opportunity to work closely with a faculty research advisor. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. This course is open to undergraduate students with an interest in pursuing a special problem as an independent research project. A written final report is required and an oral presentation is encouraged. Students should finish a contract with the instructor during the first week of the class. The students must follow American Chemical Society guidelines for preparing the final research report. Pre- or Co-requisite: CHEM 498 or consent of instructor.

DEPARTMENT OF NATURAL SCIENCES**DNCS 100 Freshman Seminar****Credit 1**

This course is designed to facilitate the adjustment of freshman science majors to college life. Aspects of preparing students for career opportunities, professional development, adjustments needed to succeed in college, study and test taking skills, crisis or stress management, and understanding the significance of the land-grant system will be discussed. Other topics include note taking, time management, conflict resolution, proper use of a science textbook, analyzing graphs and figures, test taking skills, preparing laboratory reports, and adapting to instructor style.

DNCS 400 Senior Proficiency Seminar**Credit 1**

This course is designed to evaluate the proficiency of senior level students in their major coursework. It provides students with the opportunity for the comprehensive review of the basic concepts of their major courses. The course requires students to successfully complete GRE review sessions followed by the examination, including the subject test.

¹A grade of "C" or better is required in all prerequisite courses (lecture and laboratory) to continue with sequence classes in Chemistry.

ENTOMOLOGY

ENTO 313 Entomology

Credit 3

This course provides students in the biological, agricultural and environmental sciences with the knowledge necessary to identify and study selected arthropodoan groups that influence man (*Homo sapiens*) directly or indirectly. Detailed information on how to recognize and correctly identify the organism directly or from the damage caused by it is provided. A significant part of the course is devoted to aquatic insects, parasitoids, and ectoparasites. This information enables students to work in many settings including medical technology, fisheries and wildlife biology, forensic sciences and molecular biology. Detailed information on habitats, life cycles, control measures, disease prevention, Integrated Pest Management (IPM) principles and techniques, ecology, physiology, behaviors, survival strategies, and insect/plant interactions are discussed in detail. The prerequisites for this course include: BIOL/111H (grade of C or higher). This course is comprised of three hours of lecture per week.

ENVIRONMENTAL SCIENCES

ENVS 101 Introduction to Environmental Sciences/Online

Credit 3

This is an introductory lecture-based course in environmental science for the non-science majors. This course surveys the scope and extent of man's environmental problems and also deals with socioeconomic and scientific aspects of pollution and control methods. The course emphasizes man's disruption of the environment, population, growth, urbanization, public policy, and environmental trade-offs and is also designed to discuss the scientific processes that have been applied to the identification of environmental problems.

ENVS 202 General Oceanography

Credit 3

This is a survey course of the physical and chemical processes associated with the ocean environment. Topics discussed include earth history and ocean basin evolution, global plate tectonics, the marine provinces, the chemistry of sea water, air-sea interaction, oceanic control of climate, oceanic sediments, major currents, waves, tides, water column stratification, deep-sea research, coastal and estuarine processes, and marine resources. Co-requisite: ENVS 204.

ENVS 204 General Oceanography Laboratory

Credit 1

This is a laboratory experience to accompany ENVS 202. Laboratory exercises are designed to acquaint the student with basic oceanographic methods, instruments, and data analysis. Exercises include ocean floor geology, plate tectonics and basin evolution, marine charts and navigation, salinity, beach profile determinations, bathymetry, marine weather, and seismic reflection data analysis. Field trips are also conducted during which students gain practical experience using oceanographic apparatus. Co-requisite: ENVS 202. Laboratory Fee: \$25.00

ENVS 221 Principles of Environmental Science

Credit 3

This is an interdisciplinary course that examines human influences on the world's environments. This course integrates biological, physical, and chemical sciences to study the problems affecting our environment and engages social, political, and economic concepts to understand why these problems exist and the complexity of these issues. Various topics will be discussed, including ecology of natural systems, population growth, air and water pollution, global climate change, extinction of species, use of water, land, and food resources, energy use, toxic compounds, solid wastes, and legal and economic aspects of environmental degradation. This course is for science majors only. Prerequisites: BIOL 112/112H, CHEM 112/112H.

ENVS 222 Principles of Environmental Science Lab

Credit 1

This course presents applications of basic principles in environmental sciences through experimental exercises in the laboratory, demonstration of field techniques in a problem solving setting and visits to sites that illustrate these basic principles. Co-requisite: ENVS 221. Laboratory Fee: \$25.00

ENVS 301 Marine Chemistry

Credit 3

The course provides understanding of the dynamic nature of marine ecosystems. Basic oceanography, the role of the oceans in geochemical cycles, the resident time of different elements in the ocean, the chemical cycling of elements important to biological systems, effects of the chemistry of the oceans on the future of planet Earth, and examples of human impacts on ocean chemistry will be covered. Pre-requisite: BIOL 111/111H, BIOLL13/113H and CHEM 212/212H, CHEM 214/214H.

ENVS 333 Energy, Environment and Economics

Credit 3

This course examines the scientific, social, and economic factors affecting energy consumption in the United States and world wide. The effects of global energy production on the environment are emphasized as well as the potential effects of new energy sources. Because of the potential political, social and economic ramifications, the course involves discussions and readings into the role of these factors in influencing regional and global patterns of energy consumption and resultant environmental change. Prerequisite: PHYS 122, ENVS 221.

ENVS 403/601 Marine Ecotoxicology**Credit 3**

This course cuts across traditional subject boundaries by integrating different disciplines, such as chemistry and biochemistry, through ecology and statistics. It provides students with a distinct approach to solving marine environmental pollution issues stemming from stable pollutants how they interact with biotic and abiotic components of the marine ecosystem. Pre-requisites: CHEM 112/112H, CHEM 211/211H, BIOL 112/112H and MATH 210.

ENVS 411 Water Pollution and Purification**Credit 3**

This course discusses biological, chemical, and physical impurities in water, with emphasis on agricultural, industrial, and municipal water pollution, including acid mine drainage, detergents and eutrophication, thermal pollution, oil spills, and other non-point source pollution. Further study of the physical and biochemical processes for waste-water treatment, sludge handling and disposal, and land disposal of wastewaters. Prerequisites: BIOL 111, BIOL 112/112H, CHEM 112/112H, PHYS 122/182H, ENVS 221, Junior class standing or consent of the instructor.

ENVS 413 Water Pollution and Purification Lab**Credit 1**

This course consists of a three-hour laboratory session every week, designed to provide hands-on experiences in the determination of dissolved and suspended volatile solids in liquids, biochemical oxygen demand, chemical oxygen demand, turbidity, free and residual chlorine, nutrients and metals in water and wastewaters. Co-requisite: ENVS 411. Laboratory Fee: \$25.00

ENVS 434 Air Pollution**Credit 4**

This course discusses air quality measurements and air pollution control legislation classification of atmospheric pollutants and their effects on visibility, inanimate, and animate receptors are discussed. Evaluation of source emissions and principles of air pollution control governing the distribution of air pollutants are studied. The laboratory section includes hands-on experiments to study the effect of smoke on living cells, thermal inversion, particulate collection using an impactor, effects of air pollutants on materials and field trips to electric power plant and other facilities. Prerequisites: BIOL 112/112H, CHEM 112/112H, PHYS 122/182H, ENVS 221, Junior class standing or consent of the instructor. Laboratory Fee: \$25.00.

ENVS 456 Future Sources of Energy**Credit 3**

This course examines various sources of energy used in the United States and globally. Sources discussed include fossil fuels, hydro-electricity, and nuclear energy; alternative sources of energy, including geothermal, solar, photovoltaic cells, wind, tidal, hydrogen fuels from wastes and biomass, and ocean thermal gradient. Students also study processes dealing with energy conservation and energy policy and discuss current issues. Prerequisite: PHYS 122.

ENVS 460 Earth Science**Credit 3**

This course is an interdisciplinary examination of the grand challenges confronting the environmental sciences in the 21st Century. Topics examined include biogeochemical cycles, biodiversity and ecosystem functioning, climate variability, hydrologic forecasting, infectious disease and the environment, legal control of resource use, land-use dynamics, and the re-use of materials. The practical and scientific importance of each topic is discussed as well as the readiness of the scientific establishment to meet important areas for future research. Students are expected to research and answer a series of practical hypothetical environmental problems in each area discussed. Prerequisites: ENVS 221, 222, or consent of the instructor.

ENVS 497 Environmental Science Seminar/ Online**Credit 1**

The course covers discussions on current issues in Environmental Sciences and includes student presentations. Topics such as global warming, green house effects, eutrophication, desertification, and other pertinent issues on the environment are covered. The course is opened to juniors and seniors only.

ENVS 498 Independent Study**Credit 1-3**

In this course, students conduct literature survey under the supervision of a faculty member. It is designed to enhance student comprehension of specific environmental science specialty areas. Students are required to read significant literature in selected subjects followed by discussions with the instructor. The hours and credits for this course are by arrangement with the individual instructor.

ENVS 499 Undergraduate Research**Credit 1-4**

In this course, students conduct independent research project under the supervision of a faculty member. Apart from the research, students are also expected to present oral and written reports. The course is designed for juniors or seniors who have an interest in pursuing a special problem as a research project. The hours and credits for this course are by arrangement with the individual instructor.

PHYSICS

PHYS 101 Theories and Applications of Physical Science/Online Credit 3
Physical Science is about the rules of the physical world—physics, chemistry, astronomy, geology and meteorology. This is a one-semester course intended for the non-science major. Because of the scope of these sciences, Physical Science is usually team taught whenever resources permit. Until team teaching becomes possible, choice of subject has been limited to Physics. As we assume little or no preparation on the part of the student, our choice of topics and how far to develop them is limited to emphasis on the basic concepts of each subject. This course satisfies the UMES general education requirement curriculum area III. There are three one-hour lectures per week. Prerequisites: High School Algebra or MATH 101.

PHYS 103 Physical Science Laboratory Credit 1
This course consists of two hours laboratory work per week. Selected fundamental experiments basic to physical science are designed to provide the student opportunities to learn practical knowledge necessary for a well-rounded understanding of physical science. Laboratory Fee: \$25.00

PHYS 121 General College Physics I Credit 3
This is the first semester of the two-semester course designed to provide the student with an overall view of the concepts, together with the ability to set-up and solve simple problems in physics. Areas covered include particle mechanics, heat, thermodynamics, and sound. This is a non-calculus based physics course. The course consists of three hours lecture per week. Prerequisite: MATH 109. Co-requisite: PHYS 123.

PHYS 122 General College Physics II Credit 3
This is the second semester of the two-semester course in non-calculus based physics. Areas covered include: electricity, magnetism, light, and selected topics in modern physics. The course consists of three hours lecture per week. Prerequisite: PHYS 121. Co-requisite: PHYS 124.

PHYS 123 General College Physics I Lab Credit 1
This course consists of two hours laboratory work per week. Standard laboratory experiments are selected to provide the student with practical knowledge of Physics and to enhance knowledge gained in the classroom. This course should be taken in concurrence with PHYS 121. Laboratory Fee: \$25.

PHYS 124 General College Physics II Laboratory Credit 1
This course consists of two hours laboratory work per week. Standard laboratory experiments are selected to provide the student with practical knowledge of Physics and to enhance knowledge gained in the classroom. This course should be taken in concurrence with PHYS 122. Laboratory Fee: \$25

PHYS 161 General Physics I Mechanics and Particle Dynamics Credit 3
This is the first semester of a three-semester calculus based course in general physics (see PHYS 262, PHYS 263). Areas covered include laws of motion, energy conservation, linear momentum, collisions, rotation and angular momentum, universal gravitation and fluid mechanics. Registration in the laboratory part of the course is required. Three lectures per week. Prerequisites: High School Physics and MATH 112. Co-requisite: PHYS 163. Concurrent registration in MATH 211 is recommended.

PHYS 163 General Physics Laboratory I Credit 1
This is a three-hour per week laboratory course associated with General Physics I. Laboratory exercises relate to the material covered in the lectures. The course introduces students to the modern tools of collecting and analyzing data. Labs are computer based, and extensive use of a spreadsheet program is made to analyze, plot, and interpret data. Pre-requisites: High school physics and basic knowledge of using a computer and a spreadsheet program. Co-requisite: PHYS161. Laboratory Fee: \$25.00.

PHYS 181H Introductory Physics I Honors Credit 3
This is the first semester of a two-semester calculus-based sequence in introductory physics. Topics include Newtonian mechanics, hydrostatics, thermal physics, and mechanical waves. The detailed subject matter for the course is chosen to emphasize physical principles and their applications, which are essential to an understanding of contemporary physics. Registration in the laboratory part of the course is required. Three lectures and one-hour discussion session per week. Prerequisites: High School Physics and MATH 112. Co-requisite: PHYS 183H. Concurrent enrollment in MATH 211 is recommended.

PHYS 182H Introductory Physics II Honors Credit 3
This is the second half of the two-semester course in calculus-based introductory physics. Areas covered include electrostatics, electrodynamics, geometrical and physical optics, and selected topics in modern physics. Three lectures and one-hour discussion session per week. Registration in the laboratory part of the course is required. Prerequisites: PHYS 181H and PHYS 183H. Co-requisite: PHYS 184H.

PHYS 183H Introductory Physics Laboratory I Credit 1
The course consists of one three-hour laboratory session per week to accompany PHYS181H. Laboratory exercises are designed to relate to the material covered in the accompanying course. Experiments are computer based, and a spreadsheet program is used to analyze, plot, and interpret data. Pre-requisites: High school physics and basic knowledge of using a computer and a spreadsheet program. Co-requisite: PHYS181H. Laboratory Fee: \$25.

PHYS 184H Introductory Physics Laboratory II Credit 1
The course consists of one three-hour laboratory session to accompany PHYS182H. Laboratory exercises are designed to reinforce the material covered in the accompanying course. Most experiments are computer based. Pre-requisites: PHYS181H and PHYS 183H. Co-requisite: PHYS182H. Laboratory Fee: \$25.

PHYS 262 General Physics II Waves, Heat, Electricity Credit 3
This course consists of three lecture sessions per week. This is a second semester of a calculus based, three-semester course in general physics. Areas covered include: vibrations, waves, heat kinetic theory, thermodynamics, electrostatics, and DC circuits. Registration in the laboratory part of the course is required. Prerequisites: PHYS 161 and PHYS 163. Co-requisite PHYS 264.

PHYS 263 General Physics III: Magnetism, Electrodynamics, Optics and Modern Physics Credit 3
This is the third semester of a calculus-based general physics course. Areas covered include: Magnetism, electrodynamics, geometrical and physical optics, and selected topics in modern physics. Registration in the laboratory part of the course is required Three lectures per week. Prerequisites: PHYS 262 and PHYS 264, or PHYS 182H and PHYS 184H. Co-requisite: PHYS 265.

PHYS 264 General Physics Laboratory II Credit 1
This is a three-hour per week laboratory session associated with General Physics II. Several of the laboratory exercises are computer based and focus on reinforcing the material covered in the accompanying course. Prerequisites: PHYS161 and PHYS163. Co-requisite: PHYS262. Laboratory Fee: \$25.

PHYS 265 General Physics Laboratory III Credit 1
This is a three-hour per week laboratory course intended for students enrolled in General Physics III. Experiments are designed to reinforce the material covered in the accompanying course. Modern tools are used to gather, analyze and plot data. Pre-requisites: PHYS262 and PHYS264; or PHYS 182H and PHYS 184H. Co-requisite: PHYS263. Laboratory Fee: \$25.00

PHYS 283 Modern Optics Credit 3
This course presents an in-depth discussion of the principles of geometrical and physical optics. Approximately one-fourth of the course is devoted to geometrical optics and one-half to wave optics, including wave motion and interference, diffraction, polarization, and dispersion, etc. The remaining one-fourth of the semester is devoted to quantum optics which includes recent developments in the fields of lasers. Prerequisites: PHYS 182H and PHYS 184H; or PHYS 263 and PHYS 265.

PHYS 423 Modern Physics Credit 3
This course is a survey of atomic and nuclear phenomena, special relativity, origin of quantum theory. Bohr atom, wave mechanics, atomic structure and optical spectra. This course consists of three one- hours lecture per week. Prerequisites: PHYS 182H and PHYS 184H; or PHYS 263 and PHYS 265.

PHYS 497 Physics Seminar Credit 1
This course will discuss various current topics in physics. Prerequisite: One year of physics with "B" or better grade. It is open only with consent of instructor. Designed for juniors or seniors who have an interest in pursuing a special problem as a research project.

PHYS 498 Independent Study Credit 1-3
This course is designed to enhance student comprehension of specific physics subject area. It is open to juniors and seniors with consent of instructor only.

PHYS 499 Undergraduate Research Credit 1-4
This course is designed for juniors or seniors who have an interest in pursuing a special problem as a research project. It is open only with the consent of instructor. Prerequisite: One year of Physics with "B" or better grade.

DIRECTORY OF FACULTY

- Cheney, Marcus** **Associate Professor**
B.S., Univ. of Baja Chem., .M.Sc. Bio-Inorg., U.C. Davis, Ph.D. Anal & Envir. Chem., U.C. Davis
- Chigbu, Paulinus** **Director, LMRCSC & Professor**
B.Sc. & M.Sc.; University of Benin, Nigeria; Ph.D., University of Washington, Seattle
- Dodoo, Joseph** **Lecturer**
B. Sc. Polytechnic of South Bank; M.Sc., Bedford College University of London
Ph.D., King's College, University of London
- Hearne, Jennifer** **Assistant Professor**
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- Ishaque, Ali B.** **Associate Professor**
B.Sc., University of Science & Technology; M.Sc. & Ph.D., Free University of Brussels
- Johnson, Andrea** **Research Assistant Professor**
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Ph.D., North Carolina State University
- Johnson, Linda** **Associate Professor**
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- Mack, Kelly** **Professor**
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Ph.D., City University of New York Graduate Center
- May, Eric** **Associate Professor**
B.S., Oregon State University; M.S., North Arizona State University
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