

222. Prerequisites for environmental studies major: BIO 112, 114, 215. Junior standing or consent of instructor. Offered fall.

- BIO 462. SENIOR SEMINAR 2 sh**
 This course provides students with the opportunity to conduct both individual and group literature research projects of their own choosing based on recently published scientific papers. Students participate in group discussions of the current literature, research and write a scientific review paper, and develop a formal oral presentation. Recommended for senior year. Offered fall.
- BIO 471. SPECIAL TOPICS SEMINAR 2-4 sh**
 Each seminar — a nonlaboratory discussion course for biology majors — focuses on one biological topic determined by student and faculty interest. Must have instructor's consent.
- BIO 481. INTERNSHIP IN BIOLOGY 1-4 sh**
 Advanced-level work experience in a biological field is offered on an individual basis when suitable opportunities can be arranged. Prerequisite: permission of department.
- BIO 499. RESEARCH 1-4 sh**
 Students conduct laboratory and/or field research under the direction of the biology faculty. Maximum eight semester hours total credit. Prerequisite: permission of the biology faculty.

Business Administration

Martha and Spencer Love School of Business mission statement:

To provide instruction and experiences for our students so they graduate with the knowledge, skills and character essential for responsible business leadership in the 21st century.

Chair, Department of Business Administration: Associate Professor Stevens

Professors: Gowan, Honeycutt, Noer, O'Mara

Associate Professors: Burpitt, Garber, Manning, Nienhaus, Powell, Schuette, Strempek, Valle, Yap

Assistant Professors: Buechler, Gunby, Hodge

Lecturer: Rich, Riney

Executive-in-Residence: MacMahon

The study of Business Administration at Elon University begins with a solid grounding in the traditional liberal arts and sciences. This preparation is an integral part of becoming an informed, responsible and capable business leader. An Elon education emphasizes the development of the whole person — mind, body and spirit. Business Administration courses at Elon University advance that commitment by emphasizing business knowledge acquisition, skill development through hands-on learning and experiential activities and the development of discipline, integrity and an ethic of service.

Students majoring in Business Administration at Elon University take courses in a common core representing the functional business disciplines (e.g., accounting, finance, management, marketing, MIS, etc.). They also have the opportunity to develop specialized knowledge in one of six areas of concentration: Entrepreneurship, Finance, International Business, Management, Management Information Systems and Marketing.

Our coursework emphasizes active learning and appreciative inquiry. Rather than dictate a set of principles to be memorized, our programs emphasize the integration of business knowledge and the application of that knowledge to organizational problems. We emphasize hands-on learning through internships, co-op experiences, service learning and classroom instruction which engages students in the study and practice of business. Students also develop skills in written and oral communications, team-building and problem solving, and decision-making in our increasingly global business environment.

The Bachelor of Science in Business Administration (BSBA) program at Elon University emphasizes academic challenge, mature intellectual development and a lifetime of learning. Our graduates go on to leadership positions in business and industry in for-profit and not-for-profit organizations. Our graduates are prepared for a variety of assignments because they possess an extensive array of knowledge, skills and abilities.

A major in Business Administration requires the following:

At least 50% of the business credit hours required for the degree (B.S. in Business Administration) must be earned at Elon University.

Select one course from:		4 sh
MTH	116 Applied Calculus	
MTH	121 Calculus and Analytic Geometry I	
ECO	201 Principles of Economics	4 sh
ECO	203 Statistics for Decision-Making	4 sh
ECO	301 Business Economics	4 sh
ACC	201 Principles of Financial Accounting	4 sh
ACC	212 Principles of Managerial Accounting	4 sh
CIS	211 Management Information Systems	4 sh
BUS	202 Business Communications	4 sh
BUS	221 Legal Environment of Business	2 sh
BUS	311 Principles of Marketing	4 sh
BUS	323 Principles of Management and Organizational Behavior	4 sh
BUS	326 Operations Management	4 sh
BUS	465 Business Policy	4 sh
FIN	343 Principles of Finance	4 sh
Select one course from:		0-4 sh
LSB	382 Professional Work Experience (0 credit)	
LSB	381 Internship in Business (1-4 sh)	
BUS	481 Internship in Business Administration (1-4 sh)	
Sixteen to twenty semester hours of a concentration		16-20 sh
TOTAL		70 -78 sh

Concentrations

Finance 16 sh

One course from the following:

One 300/400 level course from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society or Science). The 300/400 level Studies in Arts and Sciences course selected must be taken in addition to the upper-level GST and Advanced Study courses already required, and it may not also count for any other course in the student’s program of study. Advisors may assist students in selection of an appropriate course which should enhance the subject matter of the student’s concentration.

- FIN 413 Advanced Managerial Finance
- FIN 421 Investment Principles
- FIN 419 Financial Services **or**

FIN 471 Seminar: Special Topics

Marketing

16 sh

One course from the following:

One 300/400 level course from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society or Science). The 300/400 level Studies in Arts and Sciences course selected **must be taken in addition to** the upper-level GST and Advanced Study courses already required, and it may not also count for any other course in the student's program of study. Advisors may assist students in selection of an appropriate course which should enhance the subject matter of the student's concentration.

Three courses from the following:

- BUS 413 Integrated Marketing Communications
- BUS 414 Marketing Research
- BUS 415 Consumer Behavior
- BUS 416 Global Marketing
- BUS 417 Business-to-Business Marketing
- BUS 419 Sales Management
- BUS 473 Special Topics In Marketing

Management

16 sh

One course from the following:

One 300/400 level course from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society or Science). The 300/400 level Studies in Arts and Sciences course selected **must be taken in addition to** the upper-level GST and Advanced Study courses already required, and it may not also count for any other course in the student's program of study. Advisors may assist students in selection of an appropriate course which should enhance the subject matter of the student's concentration.

Three courses from the following:

- BUS 424 Responsible Leadership
- BUS 425 Human Resource Management
- BUS 427 Organizational Improvement
- BUS 428 Advanced Organizational Behavior
- BUS 429 Entrepreneurship/Intrapreneurship
- BUS 430 International Business Management
- BUS 471 Seminar: Special Topics in Management

Entrepreneurship

16 sh

One course from the following:

One 300/400 level course from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society or Science). The 300/400 level Studies in Arts and Sciences course selected **must be taken in addition to** the upper-level GST and Advanced Study courses already required, and it may not also count for any other course in the student's program of study. Advisors may assist students in selection of an appropriate course which should enhance the subject matter of the student's concentration.

The following three courses are to be taken in sequence as indicated:

- BUS 341 EEA1 – New Business Concepts and Market Justifications

- To be taken first term junior year.
- BUS 342 EEA2 – Writing and Defending the Business Plan
To be taken second term junior year.
- BUS 441 EEA3 - New Enterprise Start-Up and Operations
To be taken first term senior year.

International Business

16 sh

The following two classes are required:

- BUS 416 Global Marketing
- BUS 430 International Business

Two 300/400 level courses should be selected from outside Business Administration. At least one of these must be from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society, or Science). These courses must be taken in addition to the upper level GST and Advanced Study courses already required, and may not also count for any other courses in the student’s program of study. Advisors may assist students in the selection of appropriate courses which should enhance the subject matter of the IB Concentration. Courses selected are subject to approval by the IB coordinator. Intermediate proficiency in a modern foreign language is a concurrent requirement of the concentration. Proficiency can be demonstrated either by achieving an intermediate-mid level rating on an Oral Proficiency Interview (OPI) or a Simulated Oral Proficiency Interview (SOPi), by passing a modern foreign language course at the 221 level, or by placement in the language at or above the 222 level.

Management Information Systems

20 sh

One 300/400 level course from the Studies in Arts and Sciences course offerings (Expression, Civilization, Society or Science). The 300/400 level Studies in Arts and Sciences course selected must be taken in addition to the upper-level GST and Advanced Study courses already required, and it may not also count for any other course in the student’s program of study. Advisors may assist students in selection of an appropriate course which should enhance the subject matter of the student’s concentration.

- CIS 216 Programming in a Visual Environment
- CIS 301 Database Management and Analysis
- CIS 465 MIS Strategies for e-Business
- CIS 325 Web Development **or**
- CIS 330 Systems Analysis and Design

A minor in Business Administration requires the following courses:

Select one course from:		4 sh
BUS 304	Introduction to Marketing	
BUS 311	Principles of Marketing (prerequisite BUS 202)	
Select one course from:		4 sh
BUS 303	Introduction to Managing	
BUS 323	Principles of Management and Organizational Behavior (prerequisite BUS 202)	
ACC 201	Principles of Financial Accounting	4 sh
FIN 303	Introduction to Finance	4 sh
ECO 201	Principles of Economics	4 sh
TOTAL		20 sh

- BUS 202. BUSINESS COMMUNICATIONS 4 sh**
 In addition to studying the theory and principles of good oral and written communications, students practice making oral presentations and writing business reports, letters and memoranda. Prerequisites: ENG 110 and sophomore standing. Offered fall and spring.
- BUS 221. LEGAL ENVIRONMENT OF BUSINESS 2 sh**
 A number of laws influence business decisions and activities. Matters relating to competitive conduct, consumer protection, accounting and financial reporting, public communications and the natural environment are regulated by widely known federal agencies. Most states also have counterpart commissions that set additional standards and rules for business regulation. U.S. businesses enjoy a remarkably free legal environment compared to many other developed markets, and certainly more free than centrally controlled economic systems. This course explores these aspects of the U.S. business scene, with comparisons across states and other nations where appropriate. Its focus is on the legal environment, not on the legal processes, torts or case law. Its appropriate audience is the business student who needs a broad, general understanding of how we govern ourselves in the marketplace. Offered fall and spring.
- BUS 303. INTRODUCTION TO MANAGING 4 sh**
 For non majors and business administration minors, this introductory course examines universal business processes such as goal-setting, planning, decision-making, motivation, human resource management and control which are utilized by both not-for-profit and government organizations. Sophomore standing required. Credit not given in the major for BUS 303 and BUS 323. Offered fall, winter and spring.
- BUS 304. INTRODUCTION TO MARKETING 4 sh**
 For nonmajors and business administration minors, this introductory course examines marketing principles which are applied by all organizations. Sophomore standing required. Credit not given in the major for BUS 304 and BUS 311. Offered fall, winter and spring.
- BUS 311. PRINCIPLES OF MARKETING 4 sh**
 This study of the marketing and distribution of goods and services includes buyer behavior, the marketing functions, commodity and industrial markets, merchandising considerations, price policies and governmental regulation of competition. Prerequisites: ECO 201 and BUS 202. Sophomore standing required. Credit not given in the major for BUS 304 and BUS 311. Offered fall and spring.
- BUS 323. PRINCIPLES OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOR 4 sh**
 This course will prepare the student for the challenges of management and leadership in the dynamic new workplace of the 21st century. The course examines the central role of management in the efficient and effective production of goods and services. Students will learn how strategic and operational planning, job and organizational structure design and human behavior affect operations in manufacturing and service industries. Organizational behavior topics include leadership and ethics, motivation and rewards, communication and teams, and teamwork. The global dimensions of management are also emphasized. Prerequisite: BUS 202. Sophomore standing required. Credit not given in the major for BUS 303 and BUS 323. Offered fall and spring.
- BUS 326. OPERATIONS MANAGEMENT 4 sh**
 As a primary business function, operations plays a vital role in achieving a company's strategic plans. Since the operations function produces the goods and services, it typically involves the greatest portion of the company's people and capital assets. Customer service, product/service delivery, product/service quality and overall organizational effectiveness depend on excellence in operations. This course covers manufacturing and service process design, planning and control. Operations strategy, demand forecasting, supply chain management, facility location and design, e-commerce, capacity planning, inventory systems, scheduling and quality control are topics included in the course. Prerequisites: ECO 203, CIS 211, BUS 323 or 303. Sophomore standing required. Offered fall and spring.

- BUS 341. EEA 1 – NEW BUSINESS CONCEPTS AND MARKET JUSTIFICATION 4 sh**
 In the first course of the three-course entrepreneurship concentration (Elon Enterprise Academy) sequence, students identify business ideas, develop them into detailed business concepts and models, undertake research to determine the feasibility of their concepts and structure a preliminary marketing plan. At the conclusion of this course, student groups will present their ideas for evaluation. The best ideas will move on to full business plan development in BUS 342 (Writing and Defending the Business Plan). Prerequisite or corequisite: BUS 311. To be taken first term of junior year.
- BUS 342. EEA 2 – WRITING AND DEFENDING THE BUSINESS PLAN 4 sh**
 In the second course of the three-course entrepreneurship concentration (Elon Enterprise Academy) sequence, students expand their business concepts developed in BUS 341 into full business plans including complete marketing plans, operations plans, schedules and financial projections. A Venture Capital Board of business professionals will critique and judge the plans. Successful student teams will receive funding to operate their ventures the following term in BUS 441 (New Enterprise Start-up and Operations). Prerequisite or corequisite: BUS 323; Prerequisite: BUS 341; or by permission. To be taken second term junior year.
- BUS 365. BUSINESS ADMINISTRATION APPLICATIONS 4 sh**
 Topics vary yearly in the study of applications of business administration principles and theories in various business situations. Sophomore standing required.
- BUS 366. FIELD EXPERIENCE IN BUSINESS 4 sh**
 This course revolves around visits to diverse local businesses and analyses of the businesses visited. Prerequisite: permission of instructor. Sophomore standing required.
- BUS 413. INTEGRATED MARKETING COMMUNICATIONS 4 sh**
 This course focuses on the management of the communication aspects of marketing strategy. Elements of advertising, personal selling, sales promotion, direct marketing and public relations are included. The study of marketing communications includes a review of concepts from economics, behavioral sciences and social sciences, which play a role in creating, executing and evaluating promotional programs. Topics include setting communications objectives and budgets, media planning and creative strategy, all in the context of an integrated communication program. Emphasis will be placed on appreciating the scope, strengths and weaknesses of these marketing communication tools, and particularly on how they can and should be used together. Prerequisite: BUS 311. Offered spring.
- BUS 414. MARKETING RESEARCH 4 sh**
 Students apply various research methods used in business to gather and analyze marketing data. Possible effects and implications of the analyses are discussed in terms of the marketing and decision-making processes of businesses. Prerequisites: BUS 311 and ECO 203. Offered spring.
- BUS 415. CONSUMER BEHAVIOR 4 sh**
 This course for the marketing concentration focuses on the application of the behavioral sciences to understand consumer behavior. Emphasis is placed on developing an appreciation for the scope of the topic, understanding the essentials underlying consumer behavior and developing an ability to relate such understanding to important issues faced by marketing practitioners. Traditional research-oriented topics include perception, memory, affect, learning, persuasion, motivation, behavioral decision-theory and environmental (e.g., social and cultural) influences. All topic presentations will include a discussion of practitioner-oriented managerial implications. Prerequisite: BUS 311. Offered fall.
- BUS 416. GLOBAL MARKETING 4 sh**
 This course for the marketing concentration is designed to explore the scope of global marketing. The course examines the impact the global environment has upon marketing decisions and strategy formulations. Through analyses of different types of markets,

students will develop an understanding and appreciation of how the world is “shrinking” and the influence this has on U.S. businesses, individuals, households and institutions. Students will monitor the global environment and report their findings on specific regions of the world to the class. The intent is to make students more aware of the global environment and its impact on U.S. businesses. Prerequisite: BUS 311. Offered fall.

- BUS 417. BUSINESS-TO-BUSINESS MARKETING** 4 sh
 This course for the marketing concentration focuses on exploring and understanding business-to-business (B2B) marketing. The study of business-to-business marketing provides an opportunity for students to synthesize their knowledge of B2B or industrial marketing with other, highly-related business disciplines (accounting, finance and management) in order to move products through the supply chain from producer to the ultimate consumer. Business-to-business relationships, interfaces, strategies, problems and performance are explored through the case method. Prerequisite: BUS 311. Offered spring.
- BUS 419. SALES MANAGEMENT** 4 sh
 The sales management course is an analysis of professional selling practices with emphasis on the selling process and sales management, including the development of territories, determining potentials and forecasts and setting sales quotas. Prerequisite: BUS 311. Offered fall.
- BUS 424. RESPONSIBLE LEADERSHIP** 4 sh
 This course addresses the characteristics, behaviors and responsibilities required of contemporary organizational leaders. While focusing on the traditional topics (individual differences and traits of leaders, behaviors of leaders, role of power, types and styles of leadership and theories of motivation), the student will also be introduced to some nontraditional approaches (nontraditional metaphors, leadership as an art and individual differences of followers and followership) to understanding leaders and leadership. The responsibilities of leadership will be specifically addressed in relationship to the concepts of organizational success and effectiveness, social responsibility and ethical decision-making. Prerequisite: BUS 323. Offered fall and spring.
- BUS 425. HUMAN RESOURCE MANAGEMENT** 4 sh
 Effective human resource management is critical to the long-term value of an organization and ultimately to its success and survival. All aspects of human resource management — including how organizations interact with the environment; acquire, develop and compensate human resources; design and measure work — can help organizations meet their competitive challenges and create value. This course looks at the role of strategic human resource planning, recruitment and selection, performance management, developing and compensating human resources, the legal environment and employee relations, collective bargaining and labor relations, using technology to increase HRM effectiveness and global issues in HRM. Prerequisite: BUS 323. Offered fall.
- BUS 427. ORGANIZATIONAL IMPROVEMENT** 4 sh
 This course will introduce the students to material which will cover basic productivity improvement techniques, application of these techniques in his/her work place, teaching coworkers these techniques, leading work teams in problem-solving activities and managing an organizational productivity improvement program. Prerequisite: BUS 323. Offered spring.
- BUS 428. ADVANCED ORGANIZATIONAL BEHAVIOR** 4 sh
 This course addresses the impact of individual, group and organizational influences in human behavior within organizations. Building on the organizational behavior topics introduced in BUS 323, the focus of this course is on acquiring in-depth knowledge and developing interpersonal skills through the study and application of theories and concepts related to understanding and predicting human behavior in organizations. Personality, perception, job design and goal-setting, appraisal, group dynamics, decision-making, cooperation and conflict, organizational structure and culture, power and organizational

politics, organizational learning, innovation and change management, and organizational development are topics included in the course. Prerequisite: BUS 323. Offered fall and spring.

- BUS 429. ENTREPRENEURSHIP/INTRAPRENEURSHIP 4 sh**
 This course addresses how to go into business and several of the unique problems and circumstances encountered in establishing and operating a small business. Emphasis is also placed on the role of entrepreneurship in large firms through the study of “intrapreneurship.” Special emphasis focuses on why small businesses fail and what entrepreneurs can do to minimize the influence of these forces. Family-owned business management is included as one type of small business covered. Prerequisite: BUS 323.
- BUS 430. INTERNATIONAL BUSINESS MANAGEMENT 4 sh**
 This course covers business management from the perspective of the current global business environment. Students examine the overall nature of international business, the foreign environments that international businesses face and the unique situations associated with doing business across international borders. Prerequisite: BUS 323. Offered fall and spring.
- BUS 441. EEA 3 – NEW ENTERPRISE START-UP AND OPERATIONS 4sh**
 In the third course of the three-course entrepreneurship concentration (Elon Enterprise Academy) sequence, student ventures that succeed in receiving funding from the Venture Capital Board in BUS 342 (Writing and Defending the Business Plan) will implement those plans and begin operations. Periodic business reviews will be held to assess progress against projections, identify issues and identify necessary adjustments. Success will be partially determined based on venture performance and demonstrated ability to apply core business concepts. Prerequisite or corequisite: BUS 326; Prerequisite: BUS 342; or by permission. To be taken first term senior year.
- BUS 465. BUSINESS POLICY 4 sh**
 This capstone course integrates students’ experiences and previous study through case studies and simulated business decision exercises. Prerequisites: BUS 202, 311, 323; BUS 326 for Business Administration majors or ACC 336 for Accounting majors; ECO 301 (Business Administration majors only); FIN 343; and senior status. Offered fall and spring.
- BUS 471. SEMINAR: SPECIAL TOPICS IN MANAGEMENT 4 sh**
 This advanced study consists of readings and discussion of special topics and involves participation by students, faculty and other resource persons.
- BUS 472. SEMINAR: SPECIAL TOPICS IN INTERNATIONAL BUSINESS 4 sh**
 This advanced study consists of readings and discussion of special topics and involves participation by students, faculty and other resource persons.
- BUS 473. SEMINAR: SPECIAL TOPICS IN MARKETING 4 sh**
 This advanced study consists of readings and discussion of special topics and involves participation by students, faculty and other resource persons.
- BUS 481. INTERNSHIP IN BUSINESS ADMINISTRATION 1-8 sh**
 An internship experience offers the student valuable experience in business and management. Appropriate placement must be arranged by the student with the help and support of business administration faculty and other appropriate resources.
- BUS 491. INDEPENDENT STUDY 1-4 sh**
- BUS 499. UNDERGRADUATE RESEARCH IN BUSINESS ADMINISTRATION 1-4 sh**
 Students may engage in an undergraduate research study in collaboration with a faculty sponsor.

Love School of Business Courses**LSB 381. INTERNSHIP IN BUSINESS 1-4 sh**

This course is designed to provide majors in accounting and in business administration with hands-on experience. Students will work in off campus positions to confirm or clarify career goals, test what they have learned in their classes, gain a clearer sense of what they still need to learn and build their professional network. This program will be managed and monitored by the LSB internship coordinator. Students **systematically** evaluate themselves and the organization in which they work over the course of the term to determine: “If offered a career employment opportunity with this organization at the end of the term, would I accept? Why or why not?” The “why or why not” will focus on the potential fit between a student’s individual strengths/interests and the organization’s environment and culture.

LSB 382. PROFESSIONAL WORK EXPERIENCE 0 credits

The objective of the PWE is to provide students the opportunity to learn more about organizational life and about themselves and their responsibilities to an organization, while requiring academic or reflective work. This work requires a minimum of 40 hours of on-the-job work. Students arrange their own work experience, and the program will be managed and monitored by the LSB internship coordinator. This requirement will be graded as either Satisfactory (S) or Unsatisfactory (U). Offered fall, winter, spring, summer. Special fee: \$300.00 if taken during the summer or more than 4 hours during winter term. If the course is taken by a student enrolled in less than 12 semester hours or 18 or more semester hours during fall and spring semesters, the fee is \$300.00.

LSB 350. PERSONAL MASTERY I 1 sh

The purpose of this course is to further prepare business students for the exciting and challenging world of business. The course will introduce students to some perspectives and themes that are not the primary focus of other courses in the Love School of Business. The course has two primary objectives: 1) internal development, focusing on integrity, ethics, and professional development 2) ability to demonstrate those qualities. Prerequisite: Junior standing in Business Fellows Program. Offered fall.

LSB 351. PERSONAL MASTERY II 1 sh

The purpose of this course is to further prepare business students for the exciting and challenging world of business. Building on the skills developed in LSB 350, this course will focus on further developing job-search skills, including company research, networking skills, interviewing skills, and the development of a personal portfolio. The primary output for Personal Mastery II is a professional portfolio for students to showcase their academic, extracurricular and internship experiences. Creation of the portfolio will not only enable students to have an impressive visual to present to future employer; the process of creating the portfolio will better prepare them for the interview. Prerequisite: Junior standing in the Business Fellows program. Offered spring.

Chemistry

Chair, Department of Chemistry: Associate Professor Wright

Professors: Danieleley, Gooch, Grimley

Associate Professors: Karty, Sienerth

Assistant Professors: Keesey, Ponton

Adjuncts: Bernhardt, Bowling, Chandler, Schwartz

Science Lab Manager: Weller

The Department of Chemistry offers courses of study leading to either a Bachelor of Science degree (61-65 semester hours), Bachelor of Arts degree (44-48 semester hours) or

a minor in Chemistry (20-24 semester hours). Students satisfying the requirements of the Bachelor of Science degree will be certified by the American Chemical Society.

Students who major in chemistry are qualified for many pursuits. They may choose to work in the chemical industry, continue advanced studies in chemistry, take professional training in medicine, dentistry or other health-related fields, prepare to teach at the secondary level or pursue opportunities in related fields (environmental science, forensics, business and industry).

Elon's chemistry program provides the opportunity for students to engage with faculty in undergraduate research and to gain direct experience with new instrumentation using today's state-of-the-art technology. The results of the research projects are presented at local, regional and national scientific meetings.

Another key feature of the program is the introduction and use of instrumentation in the first-year general chemistry sequence and its continued emphasis throughout the chemistry curriculum. Student participation in assisting in laboratory and recitation instruction is strongly advised and supported.

A Bachelor of Science (ACS certified) degree in Chemistry requires the following courses:

CHM	111	General Chemistry I	3 sh
CHM	113	General Chemistry I Lab	1 sh
CHM	112	General Chemistry II	3 sh
CHM	114	General Chemistry II Lab	1 sh
or (in lieu of CHM 111, 113, 112, 114)			
CHM	115	Advanced General Chemistry (3 sh)	
CHM	116	Advanced General Chemistry Lab (1 sh)	
CHM	205	Inorganic Chemistry	4 sh
CHM	211	Organic Chemistry I	3 sh
CHM	213	Organic Chemistry I Lab	1 sh
CHM	212	Organic Chemistry II	3 sh
CHM	214	Organic Chemistry II Lab	1 sh
CHM	125	Chemical Literature	1 sh
CHM	311	Quantitative Analysis	4 sh
CHM	321	Instrumental Analysis	4 sh
CHM	332	Physical Chemistry I	4 sh
CHM	334	Physical Chemistry II	4 sh
CHM	351	Biochemistry I	3 sh
CHM	431	Advanced Inorganic Chemistry	4 sh
CHM	432	Physical Organic Chemistry	2 sh
CHM	461	Seminar	1 sh
CHM	499	Chemistry Research	2 sh
MTH	121	Calculus & Analytic Geometry I	4 sh
MTH	221	Calculus & Analytic Geometry II	4 sh
PHY	113	General Physics I with Calculus	4 sh
PHY	114	General Physics II with Calculus	4 sh
TOTAL			61-65 sh

A Bachelor of Arts degree in Chemistry requires the following courses:

CHM	111	General Chemistry I	3 sh
CHM	113	General Chemistry I Lab	1 sh
CHM	112	General Chemistry II	3 sh
CHM	114	General Chemistry II Lab	1 sh
or (in lieu of CHM 111, 113, 112, 114)			
CHM	115	Advanced General Chemistry (3 sh)	
CHM	116	Advanced General Chemistry Lab (1 sh)	
CHM	205	Inorganic Chemistry	4 sh
CHM	211	Organic Chemistry I	3 sh
CHM	213	Organic Chemistry I Lab	1 sh
CHM	212	Organic Chemistry II	3 sh
CHM	214	Organic Chemistry II Lab	1 sh
CHM	125	Chemical Literature	1 sh
CHM	311	Quantitative Analysis	4 sh
CHM	332	Physical Chemistry I	4 sh
CHM	461	Seminar	1 sh
MTH	121	Calculus & Analytic Geometry I	4 sh
PHY	111	General Physics I	4 sh
PHY	112	General Physics II	4 sh
(Physics 113 and 114 may be substituted for Physics 111 and 112.)			
Six semester hours from chemistry (at least 4 sh at the 300-400 level)			6 sh
TOTAL			44-48 sh

A minor in Chemistry requires the following courses:

CHM	111	General Chemistry I	3 sh
CHM	113	General Chemistry I Lab	1 sh
CHM	112	General Chemistry II	3 sh
CHM	114	General Chemistry II Lab	1 sh
or (in lieu of CHM 111, 113, 112, 114)			
CHM	115	Advanced General Chemistry (3 sh)	
CHM	116	Advanced General Chemistry II Lab (1 sh)	
CHM	211	Organic Chemistry I	3 sh
CHM	213	Organic Chemistry I Lab	1 sh
CHM	212	Organic Chemistry II	3 sh
CHM	214	Organic Chemistry II Lab	1 sh
Eight additional hours selected from:			8 sh
CHM	205	Inorganic Chemistry (4 sh)	
CHM	305	Environmental Chemistry (4 sh)	
CHM	311	Quantitative Analysis (4 sh)	
CHM	321	Instrumental Analysis (4 sh)	
CHM	351	Biochemistry I (3 sh) and	
CHM	352	Biochemistry I Lab (1 sh)	
CHM	353	Biochemistry II (3 sh) and	

CHM 354 Biochemistry II Lab (1 sh)
 CHM 471-79 Special Topics in Chemistry (2-4 sh)

TOTAL **20-24 sh**

A Bachelor of Arts Degree in Chemistry/Chemical Engineering: See requirements listed in Engineering.

CHM 101. BASIC CONCEPTS IN CHEMISTRY 3 sh

The course is designed to meet the math/science general studies requirement for nonscience majors. The material covered includes atomic structure, chemical changes, descriptive chemistry of selected elements, introduction to organic chemistry and how chemistry applies to consumer products and the environment. No credit given to students with prior credit for CHM 111. No credit for major/minor. Corequisite: CHM 102. Offered fall and spring.

CHM 102. BASIC CONCEPTS IN CHEMISTRY LABORATORY 1 sh

Laboratory exercises are based upon selected foundational concepts covered in CHM 101. No credit for students with prior credit for CHM 113. No credit for major/minor. Corequisite: CHM 101. Offered fall and spring.

CHM 111. GENERAL CHEMISTRY I 3 sh

This course introduces fundamental principles of chemistry with special emphasis on developing skills in quantitative reasoning. Topics include stoichiometry, nomenclature, gases, atomic structure and periodicity, theories of chemical binding and thermochemistry. Prerequisite: High school chemistry. Corequisites: MTH 111 or higher and CHM 113. Offered fall and spring.

CHM 112. GENERAL CHEMISTRY II 3 sh

The study of fundamental chemical principles continues with chemical kinetics, liquid/solid states, chemical equilibrium (gas phase and acid/base), thermodynamics and electrochemistry. Prerequisite: CHM 111 and CHM 113. Corequisite: CHM 114. Offered spring.

CHM 113. GENERAL CHEMISTRY I LABORATORY 1 sh

The experiments offered familiarize students with basic laboratory techniques and complement topics discussed in CHM 111. Corequisite: CHM 111. Offered fall and spring.

CHM 114. GENERAL CHEMISTRY II LABORATORY 1 sh

This course involves laboratory applications of concepts and principles discussed in CHM 112. Prerequisites: CHM 111, 113. Corequisite: CHM 112. Offered spring.

CHM 115. ADVANCED GENERAL CHEMISTRY 3 sh

This course explores fundamental principles of chemistry with an emphasis on understanding chemical concepts and quantitative reasoning. It consists of a brief review of stoichiometry, nomenclature, gases, thermochemistry, atomic structure and periodicity and more extensive coverage of chemical kinetics, electrochemistry, equilibrium systems, liquid/solid states and nuclear chemistry. This course is available for students who scored 4 or 5 on the AP chemistry exam and for students with exemplary scores on the Toledo exam. Prerequisites: High school chemistry. Corequisite: CHM 116. Offered fall.

CHM 116. ADVANCED GENERAL CHEMISTRY LAB 1 sh

This course involves laboratory applications of concepts and principles discussed in CHM 115 including mass spectrometry, atomic spectroscopy, molecular modeling, stoichiometry, thermochemistry, chemical kinetics, electrochemistry, equilibrium systems and liquid and solid states. Corequisite: CHM 115. Offered fall (for CHM 115 only).

CHM 125. CHEMICAL LITERATURE 1 sh

This writing-intensive course is centered around an in-depth study of the different ways in which new discoveries in chemistry are communicated to members of the profession. Topics include primary and secondary sources: journals, monographs, patents, commu-

nications and reviews as well as foremost references such as *Chemical Abstracts*, *The Ring Index* and *Science Citation Index*. Both classical and online search methods will be integrated into the required writing assignments. Prerequisite: CHM 211 or permission of instructor. Offered spring.

- CHM 205. INORGANIC CHEMISTRY 4 sh**
 This course will be an introduction to the field of inorganic chemistry with emphasis on nuclear chemistry, an introduction of symmetry and applications of group theory to vibrational spectroscopy, classical coordination chemistry, solid state chemistry, the periodic relationships of the elements and chemical bonding, the origin of the elements and the chemistry of hydrogen and oxygen. It will also serve as an introduction to the use of physical methods of structure determination of inorganic compounds by magnetic and spectral techniques including magnetic susceptibility, UV/VIS and IR spectroscopies and mass spectrometry. Three hours lecture, three laboratory hours per week. Prerequisites: CHM 112/114 or CHM 115/116. Offered spring.
- CHM 211. ORGANIC CHEMISTRY I 3 sh**
 Organic Chemistry introduces students to the chemistry of carbon compounds, including nomenclature, the influence of structure on physical/chemical properties, reaction mechanisms, stereochemistry, conformational analysis, synthesis and characteristic reactions of different organic compounds. Prerequisites: CHM 112/114 or 115/116. Corequisite: CHM 213. Offered fall.
- CHM 212. ORGANIC CHEMISTRY II 3 sh**
 Continuing the study of organic chemistry, this course emphasizes compounds containing oxygen or nitrogen and culminates with a survey of lipids, carbohydrates and proteins. Prerequisites: CHM 211/213. Corequisite: CHM 214. Offered spring.
- CHM 213. ORGANIC CHEMISTRY I LABORATORY 1 sh**
 Laboratory work includes determination of physical properties, separation of mixtures, some structure identification and synthesis of selected organic compounds. Prerequisites: CHM 112/114 or 115/116. Corequisite: CHM 211. Offered fall.
- CHM 214. ORGANIC CHEMISTRY II LABORATORY 1 sh 85**
 Procedures include microscale synthetic methods, molecular modeling via IBM-PC and qualitative organic analysis. Prerequisites: CHM 211, 213. Corequisite: CHM 212. Offered spring.
- CHM 305. ENVIRONMENTAL CHEMISTRY 4 sh**
 Environmental Chemistry provides a survey of chemical topics applying to selected pollutants in the air, water and soil. Such topics include production and diffusion, photochemical processes, techniques for analysis, acid-base and redox chemistry, environmental and biological effects. Laboratory work includes acid/base and buffer chemistry, analysis of heavy metal pollutants sampling techniques and resistance of selected materials to certain pollutants. No credit toward B.S. degree. Prerequisites: CHM 211/213. Offered spring of alternate years.
- CHM 311. QUANTITATIVE ANALYSIS 4 sh**
 This course introduces chemical methods of quantitative analysis, including classical, volumetric and selected instrumental methods, a discussion of error and uncertainty in measurements, and elementary statistics. Discussion also covers the underlying physical and chemical theories and laws with emphasis on chemical equilibrium. Prerequisites: CHM 111-114 or CHM 115/116. Offered fall.
- CHM 321. INSTRUMENTAL ANALYSIS 4 sh**
 Instrumental Analysis offers theory and practice of instrumental methods, with emphasis placed on spectroscopic (UV/VIS, IR, NMR, AA) and mass spectrometric methods of analysis. Prerequisites: CHM 311, and CHM 211-214. Offered spring.

- CHM 332. PHYSICAL CHEMISTRY I** **4 sh**
 The mathematical development of the physical principles in chemistry is explored. Topics include development and application of the laws of thermodynamics, equations of states, kinetic molecular theory, elementary electrochemistry and equilibria. Laboratory experiments are designed to complement lectures and include studies of phase relationships, calorimetry and gas laws. Three hours lecture and three hours lab per week. Prerequisites: CHM 111-114 or CHM 115/116; MTH 121; PHY 112 or 114. Offered fall.
- CHM 334. PHYSICAL CHEMISTRY II** **4 sh**
 The principles of quantum mechanics are developed and illustrated by use of simple systems. Spectroscopic techniques are investigated as tools for probing structure and properties of molecules. Other topics include kinetics and group theory. Laboratory experiments are designed to complement lectures and include multiple techniques to investigate reaction kinetics, laser spectroscopy, UV-VIS spectroscopy and computational techniques. Three hours lecture, three laboratory hours per week. Prerequisites: CHM 332, MTH 221, PHY 114. Offered spring.
- CHM 351. BIOCHEMISTRY I** **3 sh**
 This is a survey of biochemistry as it relates to the physiology of organisms. Topics include biochemical methodology, buffers, proteins (structure, function and synthesis), enzymes, bioenergetics, anabolism and catabolism of carbohydrates and lipids and metabolic regulation. Prerequisites: CHM 211-214. (CHM 351 is cross-listed with BIO 351.) Offered fall.
- CHM 352. BIOCHEMISTRY I LABORATORY** **1 sh**
 This laboratory investigates the rates of enzyme-catalyzed reactions, including the effect of enzyme inhibitors; the isolation/purification/analysis of proteins, lipids and carbohydrates; and some analytical techniques used in clinical chemistry laboratories. Techniques employed include affinity chromatography, electrophoresis, gas chromatography, UV-visible spectrometry and polarimetry. Prerequisites: CHM 211-214. Corequisite: CHM 351. (CHM 352 is cross-listed with BIO 352.) Offered fall.
- CHM 353. BIOCHEMISTRY II** **3 sh**
 Topics chosen to complement CHM 351 include a detailed study of primary and intermediary metabolism: syntheses and degradation of lipids, amino acids and nucleotides; metabolic coordination; signal transduction; molecular motors; and the role of cytochrome c. The use of selected case studies from medical schools will be integrated into the study of metabolism. The course will also include a student-led discussion of selected articles from the primary literature in biochemistry. Prerequisites: CHM 351-2. (CHM 353 is cross-listed with BIO 353.) Offered spring of even years.
- CHM 354. BIOCHEMISTRY II LABORATORY** **1 sh**
 This laboratory investigates the analysis of selected proteins and other biomolecules by NMR as well as the methods used in CHM 352. Experiments involving the study of dynamic processes inside living cells (metabolism) will be included. Prerequisites: CHM 351-2. Corequisite: CHM 354. (CHM 354 is cross-listed with BIO 354.) Offered spring of even years.
- CHM 431. ADVANCED INORGANIC CHEMISTRY** **4 sh**
 This course will begin with an accelerated review of the history of inorganic chemistry, atomic structure and simple bond theory. It will then provide an in-depth introduction into symmetry and group theory with applications to the description of chemical bonding in molecular orbital theory. Acid-Base and Donor-Acceptor Chemistry and the descriptive chemistry of the main group elements will be followed by an in-depth survey of organometallic chemistry. The continued application of physical methods of structure determination of inorganic compounds by magnetic and spectral techniques including magnetic susceptibility, UV/VIS and IR spectroscopies and NMR spectrometry will be presented throughout the course. Prerequisites: CHM 205, 211-214 and CHM 334. Offered fall.

- CHM 432. PHYSICAL ORGANIC CHEMISTRY** **2 sh**
 The study and applications of Hückel molecular orbital theory toward the understanding of the mechanisms of selected chemical reactions. The focus will be on empirical methods to derive mechanisms including linear free energy relationships and reaction kinetics. Techniques to be covered include photoelectron spectroscopy (PES) and computational chemistry (CC). Prerequisite: CHM 334. Offered spring.
- CHM 461. SEMINAR** **1 sh**
 Students make presentations after they do individual library research. Student seminars are supplemented with seminars by practicing scientists. All chemistry-oriented students are encouraged to attend. Credit for junior and senior majors only or by permission of the instructor. Completion of this course satisfies the oral competency requirement for the B.S. and B.A. major in Chemistry. Course is two semesters in length with 0.5 sh each semester. Students must take both semesters. Offered fall and spring.
- CHM 471-479. SPECIAL TOPICS IN CHEMISTRY** **2-4 sh**
 Advanced topics offered to meet the needs and interests of students include methods in forensic and medicinal chemistry, nuclear chemistry, nuclear magnetic resonance spectrometry, advanced organic or polymer chemistry. Prerequisites: CHM 212/214.

Classical Studies

Coordinator: Professor Gill

Classical Studies is an interdisciplinary program of studies in the languages, history, culture and heritage of the ancient and early modern world. This program gives students an opportunity for concentrated study of “Classical” ideas and practices, which form an important part of Western civilization. In addition, the program examines the ways that these ideas and practices have influenced, and been modified by, later generations. A minor in Classical Studies can serve as a valuable complement to many fields, providing depth and context for a student’s other courses, encouraging analytical study of primary sources and allowing the pleasure of reading some of Western civilization’s greatest works.

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A minor in Classical Studies requires the following:

Twenty semester hours taken from the list below and/or from other approved courses. At least eight of these semester hours must be at or above the 300-level. Courses must be chosen from at least three departments.

Acceptable courses in Classical Studies include:

ARH	210	Art and History I: Gods and Empires
ARH	211	Art and History II: Cathedrals to Conquest
ARH	343	Renaissance Art History
CLA	110	Introduction to Classical Studies
ENG	221	British Literature I
ENG	321	Classical Literature
ENG	322	Medieval Literature
ENG	323	Renaissance Literature
FNA	265	Studies in Italy/ELR
FNA	313	British Art and Architecture
GRK	110	Beginning Greek
GRK	210	Intermediate Greek