Business Administration

The Martha and Spencer Love School of Business

Chair, Department of Business Administration: Assistant Professor Valle
Professors: Burbridge, Honeycutt, Noer
Associate Professors: Baxter, Burpitt, O'Mara, Powell, Schuette, Strempek, Stevens
Assistant Professors: Cort, Hodge, Manring, Nienhaus, Peterson, Valle
Instructor: Glass

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 five areas of concentration: 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 116</td>
<td>Applied Mathematics with Calculus</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 121</td>
<td>Calculus and Analytic Geometry I</td>
<td></td>
</tr>
<tr>
<td>ECO 201</td>
<td>Principles of Economics</td>
<td>4 sh</td>
</tr>
<tr>
<td>ECO 203</td>
<td>Statistics for Decision Making</td>
<td>4 sh</td>
</tr>
<tr>
<td>ECO 301</td>
<td>Business Economics</td>
<td>4 sh</td>
</tr>
<tr>
<td>ACC 201</td>
<td>Principles of Accounting I</td>
<td>4 sh</td>
</tr>
<tr>
<td>ACC 212</td>
<td>Principles of Accounting II</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 211</td>
<td>Management Information Systems</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 202</td>
<td>Business Communications</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 221</td>
<td>Legal Environment of Business</td>
<td>2 sh</td>
</tr>
<tr>
<td>BUS 311</td>
<td>Principles of Marketing</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 323</td>
<td>Principles of Management and Organizational Behavior</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 326</td>
<td>Operations Management</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 465</td>
<td>Business Policy</td>
<td>4 sh</td>
</tr>
<tr>
<td>FIN 343</td>
<td>Managerial Finance</td>
<td>4 sh</td>
</tr>
</tbody>
</table>

Sixteen to twenty-two semester hours of a concentration 16-22 sh

TOTAL 70 -74 sh

Concentrations

Finance 16 sh
One course from the following:
One 300/400 level course from the Liberal Studies course offerings (Expression, Civilization, Society or Science). The 300/400 level Liberal Studies 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 471 Seminar: Special Topics

Marketing 16 sh
One course from the following:
One 300/400 level course from the Liberal Studies course offerings (Expression, Civilization, Society or Science). The 300/400 level Liberal Studies 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.

BUS 415  Buyer Behavior
BUS 416  Global Marketing
One course from the following:
BUS 413  Integrated Marketing Communications
BUS 414  Marketing Research
BUS 417  Marketing Channels
BUS 419  Sales Management

Management  16 sh
One course from the following:
One 300/400 level course from the Liberal Studies course offerings (Expression, Civilization, Society or Science). The 300/400 level Liberal Studies 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

International Business  20 sh
One course from the following:
One 300/400 level course from the Liberal Studies course offerings (Expression, Civilization, Society or Science). The 300/400 level Liberal Studies 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.

BUS 430  International Business Management
Eight semester hours of one foreign language: Students who choose to continue with a foreign language previously studied must take the 200-300-level courses in that language. Students who choose a language not previously studied must take the 100-200-level courses in that language.)
One course from the following:
ECO 314  International Trade and Finance
BUS 472  Seminar: Special Topics in International Business

Management Information Systems  20-22 sh
One 300/400 level course from the Liberal Studies course offerings (Expression, Civilization, Society or Science). The 300/400 level Liberal Studies 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.
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CIS 216 Programming in a Visual Environment
CIS 114 Web Site Development (or proficiency)
CIS 465 MIS Strategies for e-Business

Choose two of the following courses:
CIS 330 Systems Analysis and Design
CIS 325 Web Publishing Technology
CIS 335 Data Management and Analysis

A minor in Business Administration requires the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 304</td>
<td>Introduction to Marketing</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 311</td>
<td>Principles of Marketing (prerequisite BUS 202)</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 303</td>
<td>Introduction to Managing</td>
<td>4 sh</td>
</tr>
<tr>
<td>BUS 323</td>
<td>Principles of Management and Organizational Behavior (prerequisite BUS 202)</td>
<td>4 sh</td>
</tr>
<tr>
<td>ACC 201</td>
<td>Principles of Accounting I</td>
<td>4 sh</td>
</tr>
<tr>
<td>ACC 212</td>
<td>Principles of Accounting II</td>
<td>4 sh</td>
</tr>
<tr>
<td>ECO 201</td>
<td>Principles of Economics</td>
<td>4 sh</td>
</tr>
</tbody>
</table>

TOTAL 20 sh

BUS 202. BUSINESS COMMUNICATIONS

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

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

For nonmajors 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. No credit for both BUS 303 and BUS 323. Offered fall, winter and spring.

BUS 304. INTRODUCTION TO MARKETING

For nonmajors and business administration minors, this introductory course examines marketing principles which are applied by all organizations. Sophomore standing required. No credit for both BUS 304 and BUS 311. Offered fall, winter and spring.

BUS 311. PRINCIPLES OF MARKETING

This study of the marketing and distribution of goods and services includes buyer behavior, the marketing functions, commodity and industrial markets, merchandising
BUSINESS ADMINISTRATION

considerations, price policies and governmental regulation of competition. Prerequisites ECO 201 and BUS 202. Sophomore standing required. No credit for both 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. No credit for both 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 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 fall.

BUS 415. BUYER BEHAVIOR 4 sh
This required course for the marketing concentration focuses on the application of the behavioral sciences to understanding buyer behavior. Emphasis will be placed on developing an appreciation for the scope of the topic, understanding the essentials underlying buyer behavior and developing the ability to relate such understanding to important issues faced by marketing practitioners. Traditional research-oriented topics will include
perception, memory, affect, learning, persuasion, motivation, behavioral decision theory and environmental (e.g., social and cultural) influences. All topic presentations will also include a discussion of practitioner-oriented managerial implications. Prerequisite: BUS 311. Offered fall and spring.

BUS 416. GLOBAL MARKETING 4 sh
This required 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 and spring.

BUS 417. MARKETING CHANNELS 4 sh
Of the four major areas of marketing strategy (product, pricing, advertising and promotion, and distribution), the distribution of goods and services through multiple channels requires the greatest understanding of business-to-business marketing. The study of channel strategies gives the student an opportunity to combine knowledge of many marketing principles with that of other business disciplines (accounting, finance, management) in structuring the distribution networks to move products from producer to ultimate customer. Business-to-business relationship, problems and interfaces are explored using the case method with emphasis on channel management, performance and strategy. Prerequisite: BUS 311. Offered fall and spring.

BUS 418. COMMERCIAL LAW 4 sh
Commercial Law, a technical study of the American legal system, includes examination of Uniform Commercial Code provisions governing contracts, sales and commercial paper, creditors rights, and the law of wills and trusts. Prerequisite: BUS 221.

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
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 fall.

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 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, 326; ECO 301; 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 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.
The Department of Chemistry offers courses of study leading to either a bachelor of science degree (62 semester hours), bachelor of arts degree (48 semester hours) or a minor in chemistry (24 semester hours).

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 instruction is strongly advised and supported.

**A Bachelor of Science degree in Chemistry** requires the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 111</td>
<td>General Chemistry I</td>
<td>3 sh</td>
</tr>
<tr>
<td>CHM 113</td>
<td>General Chemistry I Lab</td>
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</tr>
<tr>
<td>CHM 112</td>
<td>General Chemistry II</td>
<td>3 sh</td>
</tr>
<tr>
<td>CHM 114</td>
<td>General Chemistry II Lab</td>
<td>1 sh</td>
</tr>
<tr>
<td>or (in lieu of CHM 111, 113, 112, 114)</td>
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<td></td>
</tr>
<tr>
<td>CHM 115</td>
<td>Advanced General Chemistry (3 sh)</td>
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</tr>
<tr>
<td>CHM 116</td>
<td>Advanced General Chemistry II Lab (1 sh)</td>
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</tr>
<tr>
<td>CHM 211</td>
<td>Organic Chemistry I</td>
<td>3 sh</td>
</tr>
<tr>
<td>CHM 213</td>
<td>Organic Chemistry I Lab</td>
<td>1 sh</td>
</tr>
<tr>
<td>CHM 212</td>
<td>Organic Chemistry II</td>
<td>3 sh</td>
</tr>
<tr>
<td>CHM 214</td>
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<tr>
<td>CHM 125</td>
<td>The Chemical Literature</td>
<td>1 sh</td>
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<tr>
<td>CHM 205</td>
<td>Inorganic Chemistry</td>
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<tr>
<td>CHM 311</td>
<td>Quantitative Analysis</td>
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<tr>
<td>CHM 332</td>
<td>Physical Chemistry I</td>
<td>4 sh</td>
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<tr>
<td>CHM 334</td>
<td>Physical Chemistry II</td>
<td>4 sh</td>
</tr>
<tr>
<td>CHM 351</td>
<td>Biochemistry</td>
<td>3 sh</td>
</tr>
<tr>
<td>CHM 421</td>
<td>Instrumental Analysis</td>
<td>4 sh</td>
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<tr>
<td>CHM 431</td>
<td>Advanced Inorganic Chemistry</td>
<td>4 sh</td>
</tr>
<tr>
<td>CHM 461</td>
<td>Seminar</td>
<td>1 sh</td>
</tr>
</tbody>
</table>
Four additional semester hours selected from:

- **CHM 499** Chemistry Research (2-4 sh)
- **CHM 300-400** Chemistry electives (0-2 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 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
- **CHM 125** The Chemical Literature 1 sh
- **CHM 205** Inorganic Chemistry 4 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 additional semester hours selected from other courses of which 4 semester hours must be from 300-400 level courses 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 to twelve additional hours to fulfill the requirement of at least 24 semester hours for the minor selected from:

- CHM 205 Inorganic Chemistry (4 sh)
- CHM 305 Environmental Chemistry (4 sh)
- CHM 311 Quantitative Analysis (4 sh)
- CHM 351 Biochemistry (3 sh) and
- CHM 352 Biochemistry Lab (1 sh)
- CHM 471-79 Special Topics in Chemistry (2-4)

**TOTAL** 20-24 sh

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

**CHM 101. BASIC CONCEPTS IN CHEMISTRY**

The course is designed to meet the math/science general studies requirement for non-science 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, winter, spring.

**CHM 102. BASIC CONCEPTS IN CHEMISTRY LABORATORY**

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, winter, spring.

**CHM 111. GENERAL CHEMISTRY I**

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, and thermochemistry. Prerequisite: High school chemistry. Corequisites MTH 111 or higher and CHM 113. Offered fall and spring.

**CHM 112. GENERAL CHEMISTRY II**

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

**CHM 113. GENERAL CHEMISTRY I LABORATORY**

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**

This course involves laboratory applications of concepts and principles discussed in CHM 112. Prerequisites: CHM 111, 113. Corequisite: CHM 112 or CHM 115. Offered spring and fall (for CHM 115 only).

**CHM 115. ADVANCED GENERAL CHEMISTRY**

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 114. Offered fall.
CHM 116. ADVANCED GENERAL CHEMISTRY LAB  
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. THE CHEMICAL LITERATURE  
This course is a writing-intensive course 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, communications 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 111. Offered spring.

CHM 205. INORGANIC CHEMISTRY  
This course will be an introduction to the field of inorganic chemistry with emphasis on classical coordination chemistry, solid state chemistry, the periodic relationships of the elements, 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 NMR spectrometry. Prerequisites: CHM 112/114 or CHM 115/114. Offered spring.

CHM 211. ORGANIC CHEMISTRY I  
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, 115/114. Corequisite: CHM 213. Offered fall.

CHM 212. ORGANIC CHEMISTRY II  
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  
Laboratory work includes determination of physical properties, separation of mixtures, some structure identification and synthesis of selected organic compounds. Prerequisites: CHM 112/114, 115/114. Corequisite: CHM 211. Offered fall.

CHM 214. ORGANIC CHEMISTRY II LABORATORY  
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  
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. Satisfies the laboratory science requirement for General Studies. No credit toward B.S. degree. Prerequisites: CHM 211/213. Offered spring of alternate years.

CHM 311. QUANTITATIVE ANALYSIS  
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, 112. Offered fall.

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; 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 and three hours lab per week. Prerequisites: CHM 332, MTH 221, PHY 114. Offered spring.

CHM 351. BIOCHEMISTRY
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, 212, 213, 214. (CHM 351 is the same as BIO 351.) Offered fall of alternate years.

CHM 352. BIOCHEMISTRY 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, 212, 213, 214. Corequisite: CHM 351. (CHM 352 is the same as BIO 352.) Offered fall of alternate years.

CHM 421. INSTRUMENTAL ANALYSIS
4 sh
Instrumental Analysis offers theory and practice of instrumental methods, with emphasis placed on spectroscopic (UV/Vis, IR, NMR, AA), mass spectrometric and radiochemical methods of analysis. Prerequisite: CHM 334. Offered spring.

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. Prerequisite: CHM 334. Offered fall.

CHM 461. SEMINAR
1 sh
Students make presentations after they do individual library or laboratory research. Student seminars are supplemented with seminars by practicing scientists. All chemistry-oriented students are encouraged to attend. Credit for senior majors only or by permission of the instructor. 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
Advanced topics offered to meet the needs and interests of students include methods in nuclear chemistry, nuclear magnetic resonance, advanced organic or polymer chemistry. Prerequisites CHM 212/214.

CHM 481. INTERNSHIP
Students gain advanced level work experience in a chemical field. Internships are offered on an individual basis when suitable opportunities can be arranged. Prerequisite: permission of department.

CHM 491. INDEPENDENT STUDIES
CHM 499. RESEARCH
In collaboration with a chemistry faculty member, students undertake experimental or theoretical investigations. Prerequisite: CHM 125. Offered fall, winter, spring.

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.

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:

ART 220 Art and History: Prehistory to the Present 4 sh
ART 312 Studies in Art History (depending on appropriateness of topic) 2-4 sh
ART 343 Renaissance Art History 4 sh
CLA 210 Introduction to Classical Studies 4 sh
ENG 221 British Literature I 4 sh
ENG 321 Classical Literature 4 sh
ENG 322 Medieval Literature 4 sh
ENG 323 Renaissance Literature 4 sh
FNA 265 Studies in Italy/ELR 4 sh
FNA 313 British Art and Architecture 4 sh
GRK 110 Beginning Greek 4 sh
GRK 210 Intermediate Greek 4 sh
GRK 310 Advanced Greek 4 sh
HST 111 Europe and the Mediterranean World to 1660 4 sh
MUS 315 The Music of Ancient Times through Mozart 4 sh
PHL 331 Ancient Philosophy 4 sh
In addition to these catalog courses, occasional courses with special topics in Classical Studies will be offered. Examples include Hebrew 110, 210, 310; HST/REL 371, The Ancient World; FRE 371 and SPN 371, Special Topics, as appropriate.

CLA 210. INTRODUCTION TO CLASSICAL STUDIES

Have you ever wondered why even Winnie the Pooh is translated into Latin? Or why so many public buildings sport curious pillars and columns? Still puzzling over the meaning of “numen lumen” or those weird Greek letters on frat house porches? Take this course to find out more about the Classical elements that have helped shape Western civilization. Students will study literature, art and architecture of the ancient Greek and Roman worlds. Students will also analyze how this Classical heritage - in various permutations - has affected later ages and cultures, including our own.

Communications

See Journalism and Communications

Computing Sciences

Chair, Department of Computing Sciences: Associate Professor Powell
Associate Professors: Schuette, B. Taylor
Assistant Professors: Conklin, V. Hightower, Hollingsworth
Instructors: Ellington, Kleckner, Van Busum
Adjunct Instructors: Bryan, Hudson, Patterson, Whiffen

The Department of Computing Sciences at Elon University offers a B.A. and B.S. in Computer Science, a B.A. in Computer Information Systems, a minor in Computer Science and a minor in Computer Information Systems. A concentration area in Management Information Systems is also an option under the Business Administration major. (See Business Administration for more information on this concentration.)

The discipline called Computer Science emphasizes problem solving based upon mathematical logic, the analysis of alternative solutions, the use of the scientific method of hypothesis development and testing, and the link between principles, creativity and implementation techniques. The experiences, challenges and discipline of computer science translate well into other areas and interests. The discipline is constantly changing; the student must become a person who is able to communicate well and learn new concepts throughout life.

Computer science students at Elon have excellent access to both faculty and equipment. They can participate in the student chapter of the Association for Computing Machinery (ACM), pursue internship and work opportunities and participate in programming contests.
Elon Computer Science students have been successful in a variety of career settings as well as graduate school. Graduates have been on employers’ “most wanted” lists, and Elon graduates are presently working as application programmers, systems programmers, system managers, system analysts, database managers, software engineers, consultants and technicians. Computer Science job opportunities will remain plentiful as the field is expected to have over 10 percent growth through 2010.

Computer-based information systems have become a critical part of the products, services and management of organizations. It is pervasive in all organization functions. It is used by accounting, finance, marketing and production facilities. The efficient and effective use of information technology is an important element in achieving competitive advantage. The information systems function has the broad responsibility to develop, implement and manage an infrastructure of information technology. The activity of developing systems for organizations and inter-organization processes involves creative use of information technology for data acquisition, communication, systems analysis and decision support.

The criticality of the information systems function has caused a large demand for information systems professionals. The job market has seen double-digit growth each year for the past five years, and this is projected to continue until the year 2020. The Elon CIS major is prepared to excel at any of the following entry level positions: systems analyst, systems integrator, Web master, database administrator, application developer, network manager/administrator and end-user training.

A Bachelor of Arts degree in Computer Science requires the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 130</td>
<td>Introduction to Computer Science</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 230</td>
<td>Algorithm Development</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 331</td>
<td>Algorithm Analysis</td>
<td>4 sh</td>
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<tr>
<td>CSC 335</td>
<td>Programming Languages/ Paradigms</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 342</td>
<td>Computer Organization and Architecture</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 351</td>
<td>Theory of Computation</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 441</td>
<td>Operating Systems</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 461</td>
<td>Senior Seminar</td>
<td>1 sh</td>
</tr>
<tr>
<td>MTH 121</td>
<td>Calculus and Analytic Geometry I</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 221</td>
<td>Calculus and Analytic Geometry II</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 241</td>
<td>Discrete Structures</td>
<td>4 sh</td>
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<td></td>
<td>A probability and/or statistics course</td>
<td>4 sh</td>
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<tr>
<td></td>
<td>One course from the following:</td>
<td>4 sh</td>
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<tr>
<td></td>
<td>CSC 431 Introduction to Parallel Computation and Algorithms</td>
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<td>CSC 445 Computer Networks</td>
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<td></td>
<td>CSC 451 Compiler Design and Implementation</td>
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<td></td>
<td>One course from the following:</td>
<td>4 sh</td>
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<tr>
<td></td>
<td>MTH 311 Linear Algebra</td>
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<tr>
<td></td>
<td>MTH 321 Calculus and Analytic Geometry III</td>
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<tr>
<td></td>
<td>MTH / CSC 415 Numerical Analysis</td>
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<td></td>
<td>MTH 421 Differential Equations</td>
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<td></td>
<td>CSC 300-400 level elective</td>
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</tbody>
</table>

**TOTAL 53 sh**
A Bachelor of Science degree in Computer Science requires the following courses:

CSC 130 Introduction to Computer Science 4 sh
CSC 230 Algorithm Development 4 sh
CSC 331 Algorithm Analysis 4 sh
CSC 335 Programming Languages/Paradigms 4 sh
CSC 342 Computer Organization and Architecture 4 sh
CSC 351 Theory of Computation 4 sh
CSC 441 Operating Systems 4 sh
CSC 461 Senior Seminar 1 sh
MTH 121 Calculus and Analytic Geometry I 4 sh
MTH 221 Calculus and Analytic Geometry II 4 sh
MTH 241 Discrete Structures 4 sh

A probability and/or statistics course 4 sh

Two courses from the following: 8 sh
CSC 431 Introduction to Parallel Computation and Algorithms
CSC 445 Computer Networks
CSC 451 Compiler Design and Implementation
CSC 499 Research

One course from the following: 4 sh
MTH 311 Linear Algebra
MTH 321 Calculus and Analytic Geometry III
MTH/CSC 415 Numerical Analysis
MTH 421 Differential Equations
CSC 300-400 level elective

Either: 8 sh
CHM 111, 112, 113, 114, or
PHY 113, 114, 117, 118, or
BIO 111, 112, 113, 114

TOTAL 65 sh

A Bachelor of Arts in Computer Information Systems requires the following courses:

CIS 114 Introduction to Web Site Development 2 sh
CIS 211 Management Information Systems 4 sh
CIS 216 Programming in a Visual Environment 4 sh
CIS 230 Information Systems Theory and Practice 2 sh
CIS 235 Information Technology Hardware and System Software 2 sh
CIS 325 Web Publishing Technologies 4 sh
CIS 330 Systems Analysis and Design 4 sh
CIS 335 Database Management and Analysis 4 sh
CIS 340 Systems Implementation 4 sh
CIS 345 Networks, Telecommunications and e-Commerce 4 sh
CIS 465 MIS Strategies for e-Business (capstone) 4 sh
PHL 115 Ethical Practice 4 sh
MTH 241   Discrete Structures 4 sh
Select one course beyond core math requirement 4 sh

Probability/Statistics if core math requirement was MTH 121 then
MTH 112 General Statistics or a probability and/or statistics course or
Quantitative Analysis if core math requirement was MTH 112 then
MTH 116 Applied Mathematics with Calculus or
MTH 121 Calculus and Analytic Geometry 1

Total 50 sh

A minor in Computer Science requires the following:
CSC 130   Introduction to Computer Science 4 sh
CSC 230   Algorithm Development 4 sh
Eight semester hours of 300-400 level Computer Science (CSC) courses 8 sh
One additional course from CSC or CIS at the 200 level or above 4 sh

Total 20 sh

A minor in Computer Information Systems requires the following:
CIS 112   Spreadsheets and their Application 2 sh or
CIS 114   Web Site Development
CIS 113   Introduction to Database Systems 2 sh
CIS 216   Programming in a Visual Environment 4 sh
CIS 330   Systems Analysis and Design 4 sh
CIS 340   Systems Implementation 4 sh
One course from the following: 4 sh
CIS 325 Web Publishing Technologies
CIS 335 Database Management and Analysis
CIS 345 Networks, Telecommunications and e-Commerce

Total 20 sh

Note: CIS 345 is an elective that requires prerequisites of CIS 211, CIS 230, CIS 235

Computer Information Systems

CIS 112. PROBLEM SOLVING WITH SPREADSHEET APPLICATIONS 2 sh
This course involves projects requiring quantitative reasoning. Microsoft Excel is used
for what-if analysis and graphical presentation of data. Fundamental functions, work- shet database features and the use of Excel to create static and dynamic web pages are covered. Prerequisite: None. Offered: fall and spring.

CIS 113. INTRODUCTION TO DATABASE SYSTEMS 2 sh
This course uses a personal database system (Microsoft Access) to implement projects
requiring the organization, manipulation and retrieval of data. Students learn how to
analyze and present their data using forms, reports and views. Basic and advanced tech- niques for data retrieval using elementary SQL and joining multiple tables are covered. Prerequisite: None. Offered: fall and spring.
CIS 114. INTRODUCTION TO WEB SITE DEVELOPMENT  
This course develops projects which require the organization and presentation of information on Internet web sites using a high level tool (Microsoft FrontPage). Lower level tools such as HTML, DHTML, cascading style sheets, XML, VB script and active server pages will be introduced. Prerequisite: None. Offered fall and spring.

CIS 211. MANAGEMENT INFORMATION SYSTEMS  
This course provides an introduction to the fundamentals of Information Systems (IS) in organizations. The course examines the role of IS in managing Customer Relationships (CRM) and introduces the fundamentals of business-process modeling using data flow diagrams and Microsoft Visio. Database Management is introduced using Microsoft Access to implement projects requiring the organization, manipulation and retrieval of data and to design and execute forms, reports and views. Elementary SQL and query construction will be covered. The strategic and global aspects of Information Systems are reviewed. Prerequisite: None. Offered fall and spring.

CIS 216. PROGRAMMING IN A VISUAL ENVIRONMENT  
This course utilizes a programming language with a visual development environment to implement computer applications. Common visual and data objects are incorporated into projects. Code is developed to respond to events induced on these objects by users or other code. Students design and present group and individual projects. Prerequisite: CIS 211 or CIS 113 and (CIS 112 or MTH 116) or permission of the instructor. Offered fall and spring.

CIS 220. COMPUTERS AND TEACHING  
Students planning teaching careers explore current trends of computing at the elementary, middle and secondary levels. Topics cover microcomputer hardware, operational techniques, and techniques for selecting, evaluating and implementing computer programs for educational use. Hands-on experience and projects expose students to computer-assisted instruction, computer-managed instruction, application software and programming languages appropriate for various grade levels and subject areas. Prerequisite: EDU 211. Offered fall and spring.

CIS 230. INFORMATION THEORY AND PRACTICE  
This course provides an understanding of organizational systems, planning and the decision process as well as how information is used for decision support in organizations. It covers decision theory and practice essential for providing viable information to the organization. It outlines the concepts of Information Systems (IS) for competitive advantage, data as a resource, IS planning and implementation, and IS change and project management. Prerequisite: CIS 211. Offered spring.

CIS 235. INFORMATION TECHNOLOGY HARDWARE AND SOFTWARE  
This course provides the hardware/system software fundamentals for various computer/network architectures used in the design, development and implementation of contemporary information systems. These concepts enable systems development personnel to explain tradeoffs in computer architecture for effective design. Topics include system architecture for single-user, central, and networked computing systems and single- and multi-user operating systems. Prerequisite: CIS 230. Offered spring.

CIS 325. WEB PUBLISHING TECHNIQUES  
This course focuses on developing platform-dependent and platform-independent Web site software using leading programming languages and techniques for both client-side and server-side programming. These include: VBScript, JavaScript, Perl, HTML, XML, Cascading Style Sheets (CSS), Java applets and Java servlets. Various methodologies for generating and storing Web content to databases will be covered. Projects will include development of Web sites to gather information and update databases. Prerequisites: CIS 114 and either CIS 216 or CSC 130. Offered fall.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CIS 330</td>
<td>Systems Analysis and Design</td>
<td>4 sh</td>
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<td></td>
<td>This in-depth study of standard techniques for analyzing and designing Information Systems (IS) emphasizes effective written and oral communication as students examine a system using a realistic business scenario. Appropriate CASE tools (Visible Analyst and/or Visio) are used during the analysis phase. Visual Basic, Crystal Reports, and Access are used during the implementation phase to create a simulated software application. Prerequisite: CIS 216. Offered both fall and spring.</td>
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<tr>
<td>CIS 335</td>
<td>Database Management and Analysis</td>
<td>4 sh</td>
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<td>This course focuses on designing, implementing, and using database systems, with emphasis on object-oriented and relational models. Students design object-oriented data models using UML and other logical data structures and structure and program database systems using Advanced MS Access (VBA), MS Visual Basic, MS SQL Server, and Oracle Developer tools. Students also design and implement data retrieval and reporting tools using Structured Query Language (SQL) and Crystal Reports, exploring the use of enterprise-level Business Intelligence tools, data warehousing, and data mining (SAS), and design and implement Web-based data management applications for e-Business using XML and ASP. Prerequisites: CIS 114 and CIS 216. Offered fall.</td>
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<tr>
<td>CIS 340</td>
<td>Systems Implementation</td>
<td>4 sh</td>
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<td>Project teams identify a business situation requiring information systems (IS) improvement. Concepts and tools for analysis and design methodology are applied. The team carries this design through the implementation phase using appropriate CASE tools, Visual Basic, Access, and Crystal Reports. This project is more in-depth than the simulation of CIS 330. Project documentation is presented in the form of a user's manual. Several class presentations are required throughout the semester, culminating with the final working software application. Prerequisite: CIS 330.</td>
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<tr>
<td>CIS 345</td>
<td>Networks, Telecommunications and E-Commerce</td>
<td>4 sh</td>
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<td></td>
<td>This course focuses on concepts and technologies associated with data and voice communications. Students learn about local and wide area networks, telecommunication systems, protocols, transmission alternatives, network architectures, and design. Hardware and software, client-server computing, and management issues are covered. Prerequisite: CIS 235. Offered spring.</td>
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<tr>
<td>CIS 371</td>
<td>Special Topics</td>
<td>1-4 sh</td>
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<td></td>
<td>Topics such as decision support and expert systems, data communications and networks, and design patterns are offered when demand is sufficient.</td>
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<tr>
<td>CIS 465</td>
<td>MIS Strategies for E-Business</td>
<td>4 sh</td>
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<td></td>
<td>The MIS and CIS capstone course explores tactical and strategic management of information systems (IS) at the business unit and enterprise level. Students examine current IS issues facing specific industries, healthcare, banking, and retail, and also explore management of IS on a global scale and within various countries/regions. The course involves a project focused on design and development of an e-Business software application. Prerequisites: CIS 216 and two courses from CIS 325, CIS 330, and CIS 335. Offered spring.</td>
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<tr>
<td>CIS 481</td>
<td>Internship in Information Systems</td>
<td>1-4 sh</td>
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<tr>
<td></td>
<td>Advanced work experiences in Computer Information Systems (CIS) are offered on an individual basis when suitable opportunities can be arranged. Prerequisites: CIS 340 and permission of instructor.</td>
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<tr>
<td>CIS 491</td>
<td>Independent Study</td>
<td>1-4 sh</td>
</tr>
</tbody>
</table>
Computer Science

CSC 130. INTRODUCTION TO COMPUTER SCIENCE  4 sh
This introduction to programming and problem solving emphasizes applications from quantitative disciplines and incorporates weekly group lab experiences. Prerequisite: MTH 100 or its exemption. Offered fall and spring.

CSC 171. SPECIAL TOPICS  1-4 sh
Students study specialized pieces of software and programming languages. Prerequisite: CSC 130.

CSC 230. ALGORITHM DEVELOPMENT  4 sh
This course continues the study of the development of algorithms and provides an introduction to the analysis of time and space complexity. Topics include program correctness, recursion, elementary data structures, modularization and program structure. Approved for advanced-level designation. Prerequisite: CSC 130. Offered fall and spring.

CSC 331. ALGORITHM ANALYSIS  4 sh
Students analyze structures and appropriate algorithms for sorting, merging and searching in the contexts of mass storage devices, internal main memory and Artificial Intelligence (AI) applications. Topics include graph algorithms, dynamic storage allocation and garbage collection. Prerequisite: CSC 230. Offered spring.

CSC 355. PROGRAMMING LANGUAGES/PARADIGMS  4 sh
This course provides an introduction to language definition structure; data types and structures; control structures and data flow; run-time characteristics and lexical analysis and parsing. Programming assignments involve the use of several languages. Prerequisite: CSC 230. Offered fall.

CSC 342. COMPUTER ORGANIZATION AND ARCHITECTURE  4 sh
Topics cover architectural levels; systems organization; digital logic; machine level; instruction formats; representation of data and computer arithmetic; assembly; linking and loading and architectural alternatives. Prerequisite: CSC 230. Offered fall.

CSC 351. THEORY OF COMPUTATION  4 sh
In this introduction to theoretical computer science and analysis of discrete mathematical structures which find application in computer science, topics may include predicate calculus, groups, coding theory, graphs, trees, formal languages, grammars, finite state automata, Turing machines and complexity theory. CSC 351 is the same as MTH 351. Prerequisites: (CSC 130; MTH 121, 241.) Corequisite: CSC 230. Offered fall.

CSC 371. SPECIAL TOPICS  1-4 sh
Topics such as computer graphics, Artificial Intelligence (AI), design of data base management systems, robotics, simulation and high performance computing are offered when demand is sufficient.

CSC 415. NUMERICAL ANALYSIS  4 sh
(Same course as described in MTH 415.)

CSC 431. INTRODUCTION TO PARALLEL COMPUTATION AND ALGORITHMS  4 sh
This course introduces the foundational concepts of parallel and distributed computation. Topics include SIMD (Single Instruction, Multiple Data) and MIMD (Multiple Instruction, Multiple Data) computation, vector processing, shared memory, concurrency issues, message passing, parallel algorithms and the complexity class NC. A large portion of the course will consist of project work, using MPI, PVM and/or Beowulf. Prerequisite: CSC 331, 342. Offered spring alternating years.

CSC 441. OPERATING SYSTEMS  4 sh
Students study the fundamental concepts of operating systems and their relationship to computer architecture, including such topics as concurrent programming, interrupt...
processing, memory management and resource allocation. Prerequisites: CSC 331, 342. Offered spring.

**CSC 445. COMPUTER NETWORKS**
This course provides an introduction to network architecture and topology. The development of networked applications will be explored. Issues examined will include common network protocols, security, quality of service and application level protocols. Prerequisite: CSC 331, 342. Offered spring alternating years.

**CSC 451. COMPILER DESIGN AND IMPLEMENTATION**
This introduction to basic techniques of compiler design and implementation includes specification of syntax and semantics, lexical analysis, parsing and semantic processing. Prerequisite: CSC 335. Offered spring.

**CSC 461. SENIOR SEMINAR**
In this capstone experience for senior Computer Science majors, students will be introduced to the Computer Science Research Enterprise. Students will present independent research both in writing and orally. Prerequisites: senior standing and one 300-level CSC course. Offered fall.

**CSC 491. INDEPENDENT STUDY**

**CSC 499. RESEARCH**
Students engage in undergraduate research under the direction of a computing sciences faculty member. Maximum of eight semester hours total credit. Prerequisite: Eligibility as determined by the undergraduate research guidelines of Elon University and approval by the department.