**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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 221</td>
<td>Art and History: Prehistory to the Present</td>
<td>4 sh</td>
</tr>
<tr>
<td>ART 343</td>
<td>Renaissance Art History</td>
<td>4 sh</td>
</tr>
<tr>
<td>CLA 110</td>
<td>Introduction to Classical Studies</td>
<td>4 sh</td>
</tr>
<tr>
<td>ENG 221</td>
<td>British Literature I</td>
<td>4 sh</td>
</tr>
<tr>
<td>ENG 321</td>
<td>Classical Literature</td>
<td>4 sh</td>
</tr>
<tr>
<td>ENG 322</td>
<td>Medieval Literature</td>
<td>4 sh</td>
</tr>
<tr>
<td>ENG 323</td>
<td>Renaissance Literature</td>
<td>4 sh</td>
</tr>
<tr>
<td>FNA 265</td>
<td>Studies in Italy/ELR</td>
<td>4 sh</td>
</tr>
<tr>
<td>FNA 313</td>
<td>British Art and Architecture</td>
<td>4 sh</td>
</tr>
<tr>
<td>GRK 110</td>
<td>Beginning Greek</td>
<td>4 sh</td>
</tr>
<tr>
<td>GRK 210</td>
<td>Intermediate Greek</td>
<td>4 sh</td>
</tr>
<tr>
<td>GRK 310</td>
<td>Advanced Greek</td>
<td>4 sh</td>
</tr>
<tr>
<td>HST 111</td>
<td>Europe and the Mediterranean World to 1660</td>
<td>4 sh</td>
</tr>
<tr>
<td>HST 323</td>
<td>Making of the English Nation to c.1660</td>
<td>4 sh</td>
</tr>
<tr>
<td>LAT 121</td>
<td>Beginning Latin I</td>
<td>4 sh</td>
</tr>
<tr>
<td>LAT 122</td>
<td>Beginning Latin II</td>
<td>4 sh</td>
</tr>
<tr>
<td>MUS 315</td>
<td>The Music of Ancient Times through Mozart</td>
<td>4 sh</td>
</tr>
<tr>
<td>PHL 331</td>
<td>Ancient Philosophy</td>
<td>4 sh</td>
</tr>
<tr>
<td>PHL 332</td>
<td>Medieval Philosophy</td>
<td>4 sh</td>
</tr>
<tr>
<td>PHL 355</td>
<td>Philosophy of Religion</td>
<td>4 sh</td>
</tr>
<tr>
<td>POL 300</td>
<td>Introduction to Political Thought</td>
<td>4 sh</td>
</tr>
<tr>
<td>REL 111</td>
<td>The Old Testament Story</td>
<td>4 sh</td>
</tr>
<tr>
<td>REL 112</td>
<td>Introduction to the New Testament</td>
<td>4 sh</td>
</tr>
<tr>
<td>REL 321</td>
<td>Unearthing the Bible</td>
<td>4 sh</td>
</tr>
<tr>
<td>REL 322</td>
<td>Old Testament Prophets</td>
<td>4 sh</td>
</tr>
<tr>
<td>REL 324</td>
<td>Book of Job</td>
<td>4 sh</td>
</tr>
</tbody>
</table>
COMPUTING SCIENCES

REL 325 Revelation and other Apocalyptic Literature 4 sh
REL 326 Life and Thoughts of Paul 4 sh
REL 329 Jesus and the Gospels 4 sh
REL 355 Philosophy of Religion 4 sh
THE 301 Theatre History and Literature I 4 sh

TOTAL 20 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 110. INTRODUCTION TO CLASSICAL STUDIES 4 sh
This course gives the student a chance to find out more about the Classical elements that have shaped Western civilization. The course looks at the literature, art and architecture of the ancient Greek and Roman worlds. It studies how our Classical heritage has affected later ages and cultures, including our own. Offered in fall semesters.

Communications
See Journalism and Communications

Computing Sciences
Chair: Associate Professor Powell
Associate Professors: Heinrichs, Schuette, B. Taylor
Assistant Professors: Conklin, Hightower, Pollard, Yap
Instructor: Hollingsworth
Senior Lecturer: Kleckner
Adjunct: Bryan

The Department of Computing Sciences at Elon University offers A.B. and B.S. degrees in Computer Science, A.B. and B.S. degrees in Computer Information Systems, and minors in Computer Science and Computer Information Systems. A concentration area in Management Information Systems (for majors in Business Administration) and minors in Multimedia Authoring or Geographical Information Systems are also available options.

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 be able to communicate well and learn new concepts throughout life. The Computer Science program at Elon is a rigorous one emphasizing the application and theory of computation. Students study programming languages, operating systems, algorithm analysis, artificial intelligence, game programming and parallel and distributed problem solving using computer technology.

The Computer Information Systems discipline centers on the development of systems that will improve the performance of people in organizations. Information systems are vital to problem identification, analysis and decision making. These skills are integral parts of many fields of study. Students in information systems apply problem-solving techniques and programming skills to the design, implementation and maintenance of these information systems. Computer Information Systems at Elon is a hands-on program that gives the stu-
dent a solid foundation in information systems, including knowledge and skills about networks, Web development, database development, systems analysis, application development and project management.

Computing Sciences students at Elon have excellent access to both faculty and equipment including a wide array of computer hardware and software. The latest versions of over 50 software development tools are updated twice annually. Every computer is replaced every three years. Opportunities for various work and independent learning experiences that complement classroom learning are available. Other opportunities for involvement include the student chapter of the Association for Computing Machinery (ACM), participation in regional and local programming contests and independent study and research. Graduates pursue employment in many areas of industry, business, education and government as well as continuing study at the graduate level.

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

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<td>Algorithm Development</td>
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</tr>
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<td>CSC 331</td>
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<td>4 sh</td>
</tr>
<tr>
<td>CSC 335</td>
<td>Programming Languages</td>
<td>4 sh</td>
</tr>
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<td>4 sh</td>
</tr>
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<td>CSC 351</td>
<td>Theory of Computation</td>
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</tr>
<tr>
<td>CSC 441</td>
<td>Operating Systems and Networking</td>
<td>4 sh</td>
</tr>
<tr>
<td>CSC 462</td>
<td>Software Development/Capstone</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 206</td>
<td>Discrete Structures</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 221</td>
<td>Calculus and Analytic Geometry II</td>
<td>4 sh</td>
</tr>
</tbody>
</table>

Select one course beyond core math requirement

- Probability/Statistics: if core math requirement was MTH 121, then MTH 112 General Statistics or a probability and/or statistics course
- Quantitative Analysis: if core math requirement was MTH 112, then MTH 121 Calculus and Analytic Geometry I

Two courses from the following: 8 sh

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<tr>
<td>CSC 410</td>
<td>Artificial Intelligence</td>
</tr>
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<td>CSC 415</td>
<td>Numerical Analysis</td>
</tr>
<tr>
<td>CSC 420</td>
<td>Game Programming and Computer Graphics</td>
</tr>
<tr>
<td>CSC 430</td>
<td>Advanced Programming Concepts</td>
</tr>
<tr>
<td>CSC 431</td>
<td>Parallel and Distributed Computation</td>
</tr>
<tr>
<td>CSC 499</td>
<td>Research</td>
</tr>
<tr>
<td>CSC 300-400</td>
<td>Level elective</td>
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</tbody>
</table>

TOTAL 52 sh

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

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<td>CSC 342</td>
<td>Computer Organization and Architecture</td>
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</table>
COMPUTING SCIENCES

CSC 351 Theory of Computation 4 sh
CSC 441 Operating Systems and Networking 4 sh
CSC 462 Software Development/Capstone 4 sh
MTH 206 Discrete Structures 4 sh
MTH 221 Calculus and Analytic Geometry II 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

Quantitative Analysis: if core math requirement was MTH 112, then
MTH 121 Calculus and Analytic Geometry I

Three courses from the following: 12 sh
CSC 410 Artificial Intelligence
CSC 415 Numerical Analysis
CSC 420 Game Programming and Computer Graphics
CSC 430 Advanced Programming Concepts
CSC 431 Parallel and Distributed Computation
CSC 499 Research
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 64 sh

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

CIS 211 Management Information Systems 4 sh
CIS 216 Programming in a Visual Environment 4 sh
CIS 245 Hardware, Systems Software and Communications 4 sh
CIS 301 Database Management and Analysis 4 sh
CIS 325 Web Development 4 sh
CIS 330 Systems Analysis and Design 4 sh
CIS 345 Networks and Telecommunications 4 sh
CIS 430 Project Implementation and Management 4 sh
CIS 450 Seminar in Information Systems (capstone) 4 sh
PHL 115 Ethical Practice 4 sh
MTH 206 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

Quantitative Analysis: if core math requirement was MTH 112, then
MTH 116 Applied Mathematics with Calculus or
MTH 121 Calculus and Analytic Geometry I

Total 48 sh
### A Bachelor of Science in Computer Information Systems

requires the following courses:

<table>
<thead>
<tr>
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<tr>
<td>CIS 211</td>
<td>Management Information Systems</td>
<td>4 sh</td>
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<tr>
<td>CIS 216</td>
<td>Programming in a Visual Environment</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 245</td>
<td>Hardware, Systems Software and Communications</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 301</td>
<td>Database Management and Analysis</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 325</td>
<td>Web Development</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 330</td>
<td>Systems Analysis and Design</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 345</td>
<td>Networks and Telecommunications</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 430</td>
<td>Project Implementation and Management</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 450</td>
<td>Seminar in Information Systems (capstone)</td>
<td>4 sh</td>
</tr>
<tr>
<td>PHL 115</td>
<td>Ethical Practice</td>
<td>4 sh</td>
</tr>
<tr>
<td>MTH 206</td>
<td>Discrete Structures</td>
<td>4 sh</td>
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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 I

Choose one of the following Information Systems Environments: **16 sh**

- **Business Option:** Select any four courses from the Business Administration minor **or**
- **Biology Option:** BIO 111 and BIO 113; BIO 112 and BIO 114 Select 8 hours taken from BIO 200, 300 or 400 level courses of interest **or**
- **Criminal Justice Studies Option:** Select at least one course from CJS minor core: PSY 357, SOC 355 or HUS 359

Select 12 hours from remaining CJS minor core or other available electives

**Total** **64 sh**

### A minor in Computer Science

requires the following:

<table>
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<th>Credit Hours</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>
</tbody>
</table>

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:

<table>
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</thead>
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<td>CIS 211</td>
<td>Management Information Systems</td>
<td>4 sh</td>
</tr>
<tr>
<td>CIS 216</td>
<td>Programming in a Visual Environment</td>
<td>4 sh</td>
</tr>
</tbody>
</table>
COMPUTING SCIENCES

CIS 245 Hardware, Systems Software and Communications 4 sh
CIS 301 Database Management and Analysis 4 sh
One course from the following: 4 sh
   CIS 325 Web Development
   CIS 330 Systems Analysis and Design
   CIS 345 Networks and Telecommunications

Total 20 sh

Multimedia Authoring Minor: See Multimedia Authoring

Geographic Information Systems Minor: See Geographic Information Systems

Concentration in Management Information Systems: See Business Administration

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, worksheet 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 techniques for data retrieval using elementary SQL and joining multiple tables are covered. No credit for students with CIS 211. Prerequisite: None. Offered: fall and spring.

CIS 114. INTRODUCTION TO WEB SITE DEVELOPMENT 2 sh
   This course develops projects which require the organization and presentation of information on Internet Web sites using HTML and a high-level tool (Microsoft FrontPage). Prerequisite: None. Offered: fall and spring.

CIS 211. MANAGEMENT INFORMATION SYSTEMS 4 sh
   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 4 sh
   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: core math requirement or permission of the instructor. Offered: fall and spring.

CIS 220. COMPUTERS AND TEACHING 3 sh
   This course is designed for students who are planning to teach at the elementary, middle or secondary level and provides an introduction to the role of technology in teaching and learning in K-12 schools. The course provides opportunities for students to develop basic skills in using technology and in selecting and applying technology
appropriately to enhance teacher productivity and student learning. Prerequisite: EDU 211. Offered fall and spring.

CIS 245. HARDWARE, SYSTEMS SOFTWARE AND COMMUNICATIONS 4 sh
This course provides the hardware/system software fundamentals for various computer/network architectures used in the design, development and implementation of contemporary information systems. Topics include system architecture for single-user, central and networked computing systems and single- and multi-user operating systems. Prerequisite: core math requirement. Offered fall.

CIS 301. DATABASE MANAGEMENT AND ANALYSIS 4 sh
This course focuses on designing, implementing and using database systems with emphasis on relational and object-relational models. Students design and deploy relational database models. Students will learn SQL and will be able to design complex reports and queries to answer business problems. This course also provides a short introduction to basic concepts of data analysis and data mining using simple descriptive statistics and SQL. Prerequisite: CIS 211 and CIS 216. Offered fall and spring.

CIS 310. INTERACTION DESIGN FOR WEB AND MULTIMEDIA 4 sh
This course provides Multimedia Authoring minors and other non-CSC/CIS majors with a complete overview of Web development, including theories of information architecture and user interface design. Students will develop Web sites of medium complexity after learning the basics of page markup and interactive Web programming. Prerequisite: None. Offered spring.

CIS 320. BUILDING INTERACTIVE WEB SITES 4 sh
This course provides Multimedia Authoring minors and other non-CSC/CIS majors with a knowledge of how to integrate database systems with a Web site. Students will develop Web sites of medium complexity after learning the basics of relational database design and three-tier Web programming. Prerequisite: None. Offered fall.

CIS 325. WEB DEVELOPMENT 4 sh
This course provides a complete overview of the Web site development process. Students will create complex, interactive Web sites. Prerequisite: CIS 301. Offered fall.

CIS 330. SYSTEMS ANALYSIS AND DESIGN 4 sh
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 301. Offered fall.

CIS 345. NETWORKS AND TELECOMMUNICATIONS 4 sh
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 245. Offered spring.

CIS 371. SPECIAL TOPICS 1-4 sh
Topics such as decision support and expert systems, data communications and networks, and design patterns are offered when demand is sufficient.

CIS 430. PROJECT IMPLEMENTATION AND MANAGEMENT 4 sh
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. 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. Corequisite: CIS 345. Offered spring.

**CIS 450. SEMINAR IN INFORMATION SYSTEMS**  
4 sh  
The capstone experience for senior CIS majors involves a close review of the conceptual and theoretical foundations of the discipline. Contemporary issues, problems and trends in CIS are discussed. Students will complete a major research paper and presentation. Prerequisites: Senior standing and at least one 300-level CIS course. Offered spring.

**CIS 465. MIS STRATEGIES FOR E-BUSINESS**  
4 sh  
The MIS 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. Prerequisite: CIS 325 or CIS 330. Offered spring.

**CIS 481. INTERNSHIP IN INFORMATION SYSTEMS**  
1-4 sh  
Advanced work experiences in computer information systems (CIS) are offered on an individual basis when suitable opportunities can be arranged. Prerequisites: permission of instructor.

**CIS 491. INDEPENDENT STUDY**  
1-4 sh  

**CIS 499. RESEARCH**  
1-4 sh  

**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. 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. Prerequisites: CSC 230 and MTH 206. Offered spring.

**CSC 335. PROGRAMMING LANGUAGES**  
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 cross-listed with MTH 351. Prerequisites: CSC 130, MTH 121, 206. Corequisite: CSC 230. Offered spring.

CSC 371. SPECIAL TOPICS 1-4 sh
Topics such as genetic programming, grid computing, decision analysis, design of database management systems, robotics, simulation and high-performance computing are offered when demand is sufficient.

CSC 410. ARTIFICIAL INTELLIGENCE 4 sh
This course is an introduction to the area of Artificial Intelligence systems. Students will learn concepts of knowledge representation, reasoning, acting under uncertainty and learning. Applications studied will include game playing, natural language and expert systems. Prerequisite: CSC 230. Offered fall alternating years.

CSC 415. NUMERICAL ANALYSIS 4 sh
(Cross-listed with MTH 415.)

CSC 420. GAME PROGRAMMING AND COMPUTER GRAPHICS 4 sh
A study of two major areas of programming video games: graphics and gaming. Students will learn the fundamentals of two- and three-dimensional graphic programming, including object transformations, ray tracing, collision detection and animation as well as the components of gaming, including intelligent game playing, types of games and creating engaging storylines. Prerequisite: CSC 230. Offered fall alternating years.

CSC 430. ADVANCED PROGRAMMING CONCEPTS 4 sh
This course will focus on advanced programming concepts beyond the core computer science material. The material in the course continually evolves guided by the needs of students, the expertise of faculty members and technology trends. Currently, the course focuses on developing enterprise level, multi-tier distributed applications. The course explores the major technologies used by server side applications. Using a commercial application server, students will design and implement a significant programming project using either Enterprise JavaBeans or WebServices. Prerequisites: CSC 331, CSC 335. Offered spring alternating years.

CSC 431. PARALLEL AND DISTRIBUTED COMPUTATION 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 AND NETWORKING 4 sh
Students study the fundamental concepts of operating systems and computer networks. Topics include concurrent programming, process management, memory management, resource allocation, network protocols and stacks and application-level protocols. Prerequisites: CSC 331, 342. Offered spring.

CSC 462. SOFTWARE DEVELOPMENT/CAPSTONE 4 sh
This capstone course combines a range of topics integral to the specification, design,
implementation and testing of a medium-scale software system with the practical experience of implementing such a project as a member of a team. In addition to material on software engineering, the course includes material on human computer interaction and on professionalism and ethical responsibilities in software development. Prerequisites: CSC 331, CSC 335. Offered fall.

**CSC 481. INTERNSHIP IN COMPUTER SCIENCE** 1-4 sh
Advanced work experiences in Computer Science are offered on an individual basis when suitable opportunities can be arranged. Prerequisites: permission of instructor.

**CSC 491. INDEPENDENT STUDY** 1-4 sh
**CSC 499. RESEARCH** 1-4 sh
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.

**Cooperative Education**

Director of Experiential Education: Assistant Professor P. Brumbaugh
Assistant Professors: Allison, Donathan, Kosusko, Lipe, Magee, Martin, Olive-Taylor, L. Rich

The Career Center offers courses designed to acquaint Elon students with the career decision-making process, to assist them in career exploration and prepare them for the job search.

**COE 110. EXPLORING CAREERS/MAJORS** 1 sh
This class assists students in exploring majors and careers. Topics include personal values and needs assessment, interest and skill inventories, and career decision-making skills. Recommended for freshmen and sophomores. Offered fall and spring in a half-semester format.

**COE 310. CONDUCTING AN EFFECTIVE JOB SEARCH** 1 sh
This course helps students prepare for internships, co-ops, summer jobs and permanent employment. Students develop strategies to achieve career goals, investigate critical issues in the workplace, develop a resume and a cover letter and learn how to network and interview effectively. Recommended for sophomores, juniors and seniors. Offered fall and spring in a half-semester format.

**COE 381-386. CO-OP WORK EXPERIENCE** 1-16 sh
This series of courses involves careful monitoring of students in either a part-time or full-time work experience. Students apply classroom theory in a job related to their major/minor/career objectives. Prerequisite: admission to the program.

The Cooperative Education Work Experience program enables qualified students to combine classroom theory with professional work experience while completing their degrees. The student may work full time or part time with an employer selected and/or approved by the university. Credit hours are based on the number of hours worked during the term — a maximum of 16 semester hours of internship/cooperative education credits may be applied to the 132 semester hours required for the A.B. and B.S. degrees. Evaluation is based on reported job performance and student reflection on that performance through papers, journals, seminars, class presentations and readings. Contact the Director of Experiential Education for more information.

ELIGIBILITY REQUIREMENTS: Sophomore, junior or senior standing; minimum 2.0 GPA; approval of faculty/Experiential Education Director. COE 310 class recommended.
Criminal Justice

Coordinator: Associate Professor McClearn

The Criminal Justice program engages students in the interdisciplinary study of crime and criminal justice, primarily within the United States. Students will gain an understanding of the psychological and sociological dimensions of crime as well as insights into the workings of the criminal justice system and its components. Students will study both academic and applied aspects of the field. Ethical implications and critical analysis of issues will be stressed.

A minor in Criminal Justice Studies requires the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PSY 357</td>
<td>Criminal Behavior</td>
<td>4 sh</td>
</tr>
<tr>
<td>SOC 355</td>
<td>Sociology of Crime</td>
<td>4 sh</td>
</tr>
<tr>
<td>HUS 359</td>
<td>Criminal Justice</td>
<td>4 sh</td>
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<td></td>
<td>Eight semester hours of electives selected from the following:</td>
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<tr>
<td>CJS 371-9</td>
<td>Special Topics in Criminal Justice</td>
<td>8 sh</td>
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<tr>
<td>CJS 481</td>
<td>Internship in Criminal Justice</td>
<td></td>
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<tr>
<td>CJS 491</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>PHL 341</td>
<td>Philosophy of Law</td>
<td></td>
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<td>POL 324</td>
<td>Civil Liberties</td>
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<tr>
<td>SOC 342</td>
<td>Social Deviance</td>
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<td></td>
<td>Other courses as approved by the program coordinator</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td>20 sh</td>
</tr>
</tbody>
</table>

CJS 371-379. SPECIAL TOPICS IN CRIMINAL JUSTICE 2-4 sh
A series of courses reflecting new contributions to the Criminal Justice field and in-depth treatments of topics of special interest, such as terrorism and organized crime. Prerequisites: junior standing and at least one core course, or permission of the instructor. Courses may be cross-listed with other disciplines.

CJS 481. INTERNSHIP IN CRIMINAL JUSTICE 2-4 sh
Students apply classroom knowledge to a law enforcement setting. Internships in a criminal justice setting taken from other disciplines might substitute for CJS 481; approval for any such substitutions must be obtained from program coordinator before registration. Prerequisites: junior standing, at least one core course and approval of instructor and program coordinator.

CJS 491. INDEPENDENT STUDY 1-4 sh
Advanced study on a topic of special interest. Prerequisites: junior standing, at least one core course and approval of instructor and program coordinator.

CJS 499. RESEARCH 1-4 sh
In collaboration with a faculty member, students undertake an empirical or theoretical study of a topic in the realm of Criminal Justice studies. Research projects may include a review of the relevant research literature, data collection and analysis, and a presentation or report when the study is completed. Prerequisites: junior standing, at least one core course and approval of instructor and program coordinator. A research proposal form completed by the student in conjunction with the faculty member is required for registration.