Department of Mathematics and Computer Science

Associate Professors: Brooke M. Andersen, Kevin J. Carlin, Robert M. Fry, Suzanne Kelton; *Assistant Professors*: Joseph A. Alfano (Chairperson), Matthew Creek, William Katcher; *Visiting Instructor*: Suzanne L. Kozak; *Lecturers*: Ali Al-Faris, Paul Chase, Pawan Gupta, Dana James, Karen McGrail, Gerald Taylor, Keith Trott, Maria Cevallos Warren.

MISSION STATEMENT: COMPUTER SCIENCE

The Computer Science program at Assumption College serves all students interested in computer science, computers, and their applications in a supportive and stimulating learning environment. As the science of computer technology, we support the liberal arts mission of the college through the Core Curriculum. As a source of computing skills, we offer courses supporting the development of technical proficiency. For those students who become majors or minors in computer science, we seek to develop their programming skills, their knowledge of computer hardware and software, and an appreciation of the social and ethical implications of technology. The major provides a foundation for a variety of professional careers in the computer industry and for graduate study in computer science.

MINOR IN INFORMATION TECHNOLOGY (6)

The IT Minor consists of six courses, which comprise two required courses, and four electives taken in the Applied Track (for students majoring in Accounting); the Online Track (for students majoring in Marketing or Organizational Communication) or the Analytical Track (for students majoring in Management or International Business).

Required Courses (2)

1) CSC 113   Introduction to Computer Science
2) ACC 211   Accounting Information Systems
                    OR
   MGT/MKT 302 Management Information Systems

Electives (4)

Applied Track Electives:
CSC117, CSC118, CSC119E (Continuing and Career Education Course), CSC175, CSC250, CSC301, CSC315, MKT326, MKT327
Online Track Electives:
CSC 117, CSC118, CSC175, CSC250, CSC301, CSC315, MKT326, MKT327
Analytical Track Electives:
CSC117, CSC175, CSC250, CSC261, CSC301, CSC327, MKT326

Software Development

Students interested in software developer positions should consult with the Chairperson of the Department of Mathematics and Computer Science to plan a course of study. Suggested coursework includes a major in Computer Science taking the electives CSC 301 Systems Analysis and Design and CSC 317 Java Programming

Course Descriptions_____

COMPUTER SCIENCE (CSC)

CSC 110   EXCEL
This course will familiarize students with selected features of the Microsoft Excel spreadsheet program. Basic skills learned can be adapted for use in courses involving business, accounting, statistics, science, math, and other areas. Applied problems from

various fields will be used as examples. Prerequisite: Math placement at the level of MAT 114 or higher or completion of MAT 111. (Fall, Spring)

Al-Faris/*One credit*

CSC 113   INTRODUCTION TO COMPUTER SCIENCE

This course presents an overview of computers and their applications. Students are exposed to a variety of platforms (e.g. MAC, PC, etc.). Topics include popular applications as well as hardware, software, the Internet, social implications and multimedia. Not open to those who have taken CSC 117. (Fall, Spring)

Al-Faris/*Three credits*

CSC 117   INTRODUCTION TO PROGRAMMING

This course is an introduction to the field of computer science and structured programming in C++. Topics include basic computer architecture, the algorithmic approach to problem solving, various number systems, and logic. The programming language constructs introduced include types of variables, arithmetic operations, input/output, decision statements, loops, and functions. (Fall)

Warren/*Three credits*

CSC 118   INTERNET

The purpose of the course is to give a deeper understanding of what the Internet is, how it works, and how the uses of it are changing. Students will cover the history, why the technology works, the ethics in using an open system, advanced settings, what is involved in designing, creating, and maintaining a web site, and be able to discuss the problems and possible future of this topic. Our task in this class is to jointly investigate how the Internet can and is being used. We will try together to cover and understand topics that most users of the Internet are not yet using such as RSS, blogs, wikis, mashups, clouds, apps and how to better search and evaluate the materials found. My hope is that we will cover materials that you do not know even exists. (Fall)

Chase/*Three credits*

CSC 120   STATISTICS PROGRAMMING

This course introduces the Python programming language and the R programming language for statistical computing. Students will gain proficiency in writing computer programs to solve basic problems in data analysis. Applied problems will be chosen from a wide variety of subject areas. Prerequisite: Math placement at the level of MAT 114 or higher or completion of MAT 111. (Fall)

Alfano/*Three credits*

CSC 130   DATA VISUALIZATION

This course introduces computer-based techniques for the visual display of quantitative information. Students will gain proficiency in the use of Excel, Tableau, and R to produce effective data visualizations and information graphics. Prerequisite: ECO 115, SOC 300 or PSY 265 Statistics. (Spring)

Staff/*Three credits*

CSC 175   DATABASES AND SPREADSHEETS

This course covers the establishment and effective use of a database using Access: design, screen forms and data-entry, queries, updating, linking related tables, report generation, and export/import to other programs. It also presents the design and application of spreadsheets using Excel: formatting, ranges, built-in functions, user-defined formulas, array formulas, table-lookups, summaries by pivot tables, graphing, linking, and macros. Some mathematical background is assumed. Prerequisite: CSC 113 or CSC 117. (Fall)

Katcher/*Three credits*

CSC 231   COMPUTER ARCHITECTURE

A course introducing the student to computer architecture and assembly language programming. Topics will include memory and addressing, data representation, real and integral arithmetic, instruction formats and sets, indexing, subroutines, and error correction. Prerequisite: CSC 117 or equivalent. (Fall 2018, Fall 2020)

Katcher/*Three credits*

CSC 233   LARGE DATA SETS

This course gives the student a detailed introductory experience in skills required for performing data analytics. These skills may include, but are not limited to: data extraction and import; data tidying and transformation; data visualization for

exploratory analysis; constructing statistical models from the data; assessing and improving the models; and communicating the results. The programming language, e.g. R or Python, is determined by the instructor. Prerequisite: CSC 120. (Spring)
Alfano/*Three credits*

CSC 250   INTERMEDIATE PROGRAMMING
This course extends the computer science and programming concepts introduced in CSC 117. The advanced topics include: objects, pointers, arrays, records, string types, and functions with output parameters. Prerequisite: CSC 117. (Spring)
Staff/*Three credits*

CSC 260   COMMAND LINE INTERFACES
This course introduces a command language computing environment, the bash shell interface to the Linux operating system. Topics covered include: an exploration of the bash shells, hierarchical file structure, file permissions, multiuser systems, utilities, shell scripts, I/O redirection, pipes, and programming in C11. Prerequisite: CSC 117. (Spring)
Katcher/*Three credits*

CSC 261   SIMULATION
Exposition of basic ideas of digital computer simulation of stochastic processes, and the application of those ideas to practical problems. Prerequisite: CSC 117. (Spring 2020, Spring 2022)
Katcher/*Three credits*

CSC 301   SYSTEMS ANALYSIS AND DESIGN
A course dealing with all aspects of system design and implementation. Problem definition, feasibility study, system design tools, system development control, and implementation and evaluation of systems will be covered. Prerequisite: CSC 117 or equivalent. (Fall 2019, Fall 2021)
Katcher/*Three credits*

CSC 303   OPERATING SYSTEMS
This course introduces operating system design emphasizing process management for multiuser and networked systems. Topics covered include: process scheduling, interprocess communication, race conditions and solutions, memory, device and file management. Prerequisites: CSC 260 and CSC 305. (Spring 2019, Spring 2021)
Staff/*Three credits*

CSC 305   DATA STRUCTURES
This course introduces complex data structures such as trees, lists, stacks, and matrices. It also covers the classification of an algorithm by computing its order. The algorithms that will be analyzed include various sorting and searching methods. Prerequisite: CSC 250. (Fall)
Al-Faris/*Three credits*

CSC 310   INTERACTIVE COMPUTER GRAPHICS
This course presents the basic principles for the design and use of computer graphic systems. Topics include graphics devices, two- and three-dimensional representations, transformations, rotations, scaling, device independence, windowing, and clipping. Prerequisite: CSC 305 must be completed or taken concurrently. (Fall 2020, Fall 2022)
Fry/*Three credits*

CSC 315   E-COMMERCE
Learn to use the fastest-growing marketplace in the world! This course is an introduction to the world of electronic commerce, covering technical and business topics. Case studies and business examples, including triumphs and flops, are analyzed. The course considers ways that EC is affecting the business community, and the problems managers face as they adapt to doing business in cyberspace. Prerequisite: CSC 113 or CSC 117. (Spring)
Chase/*Three credits*

CSC 317   JAVA PROGRAMMING
Java is an object-oriented programming language with many interactive multimedia capabilities. This course covers the fundamentals of Java programming language, including how to write, debug, and execute Java programs. The course covers object-oriented programming techniques, as well as creating Java applets and applications. Prerequisite: CSC 305. (Spring 2019, Spring 2021)

Katcher/*Three credits*

CSC 321   DATABASE MANAGEMENT SYSTEMS
This course deals with both the operational and decision support environment of database systems. Topics include indexing, randomization, physical blocking, and relational and hierarchical structures. Previous experience at the level of CSC 175 or equivalent is recommended. Prerequisite: CSC 305. (Spring 2019, Spring 2021)
Katcher/*Three credits*

CSC 325   ARTIFICIAL INTELLIGENCE
This course is an open-ended discussion of what Artificial Intelligence (AI) is and how it might be achieved. Computers are defined as abstract machines. Defining intelligence is approached using results from neuroscience and cognitive psychology. Practical AI applications discussed include: language-understanding, robotics, expert systems, neural nets, and game-playing programs. Prerequisite: CSC 305 must be completed or taken concurrently. (Fall 2019, Fall 2021)
Gupta/*Three credits*

CSC 327   OPERATIONS RESEARCH
Concepts, methods, and introduction to the theory of optimization of linear systems. Topics to include simplex method, duality, sensitivity, formulation, and classic problems, e.g., maximal flow, travelling salesman, and assignment. Prerequisites: CSC 305 must be completed or taken concurrently. (Fall 2018, Fall 2020)
Katcher/*Three credits*

CSC 330   COMPUTER NETWORKS
This course examines principles and current trends in computer networks. It covers local area network (LAN) technology, network architecture, network layers using the ISO's reference model for open systems, protocols, network topology, internet working devices, and data communications. The course utilizes elementary concepts and offers hands-on experience with LANs. Prerequisite: CSC 113 or CSC 117. (Spring 2018)
Gupta/*Three credits*

CSC 333   MACHINE LEARNING
This course studies the construction of computer algorithms that can learn from and make predictions on data sets. Methods for supervised learning (linear regression, logistic regression, regularization, support vector machines, decision trees, naïve Bayes, linear discriminant analysis) and unsupervised learning (k-means, principal component analysis, matrix factorization, singular value decomposition). Issues of feature selection, dimensionality reduction, bias-variance tradeoff, cross-validation. Prerequisite: CSC 233. (Fall)
Alfano/*Three credits*

CSC 335   COMPUTER AND NETWORK SECURITY
This course provides a survey of the concepts of information security, computer security and information assurance system. A focus on both fundamentals and practical information will be stressed. Topics include a study of security services (integrity, availability, confidentiality, etc.), security attacks, vulnerabilities, exploits, and applications of security techniques for new services. Prerequisite: MAT 117 or above; or ECO 115; or CSC 117 or above. (Fall 2018)
Gupta/*Three credits*