CSCI 107. Joy and Beauty of Computing. 3 Credits. (3 Lec) F.S
Examines the computing field and how it impacts the human condition.
Introduces exciting ideas and influential people. Provides a gentle introduction to
computational thinking using the Python programming language.

CSCI 112. Programming with C I, II. 3 Credits. (2 Lec., 1 Lab) F.S
PREREQUISITE: CSCI 111 or CSCI 127 or ELEE 101. C Programming knowledge.
Introduces imperative programming and the C standard library. Course covers
pointers, memory management and structures.

CSCI 127. Joy and Beauty of Data. 4 Credits. (3 Lec., 1 Lab) F.S
COREQUISITE: CSCI 151Q Provides a gentle introduction to the exciting world of big data and data science. Students expand their ability to solve problems
with Python by learning to deploy lists, files, dictionaries and object-oriented
programming. Data science libraries are introduced that enable data to be
manipulated and displayed. To succeed in this course, either basic computer
literacy or CSCI 107 is recommended.

CSCI 132. Basic Data Structures and Algorithms. 4 Credits. (3 Lec, 1 Lab) F.S
PREREQUISITE: CSCI 111 or CSCI 127 and M 151Q. An examination of
advanced Java and basic data structures and their application in problem solving.
Data structures include stacks, queues and lists. An introduction to algorithms
employing the data structures to solve various problems including searching and
sorting, and recursion. Understanding and using Java class libraries. The laboratory
uses Java. Introduces Big-O Notation.

CSCI 204. Multimedia Dev Methods. 3 Credits. (2 Lec., 1 Lab) S On Demand
The design and development of multimedia presentations using computerized
studio techniques. Methods for combining video, audio, photography, studio
techniques, and computer-generated art forms. Computer-assisted studio control
and editing. Project-oriented course organization with interdisciplinary project
teams.

CSCI 215CS. Social & Ethical Issues in Computer Science. 3 Credits. (2 Lec., 1 Rec) F.S
PREREQUISITE: W core and US core. Social and ethical issues as they relate to computing, including privacy, risks, computer abuse, commerce, professionalism,
free speech, intellectual property, social justice, and current issues. History of computing.

CSCI 232. Data Structures and Algorithms. 4 Credits. (3 Lec., 1 Lab) F.S
PREREQUISITE: CSCI 132. Advanced data structures and programming techniques and their application. Topics include: trees, balanced trees, graphs,
dictionaries, hash tables, heaps. Examines the efficiency and correctness of
algorithms. The laboratory uses Java. CSCI 246 is recommended as a prerequisite.

CSCI 246. Discrete Structures. 3 Credits. (3 Lec) F.S
PREREQUISITE: M 171Q. COREQUISITE: CSCI 132. This course covers logic,
discrete probability, recurrence relations, Boolean algebra, sets, relations, counting,
functions, maps, Big-O notation, proof techniques including induction, and proof
by contradiction.

CSCI 290R. Undergraduate Research. 1-6 Credits. (1-6 Ind; max unlimited) F.S
Directed undergraduate research which may culminate in a written work or other
creative project. Course will address responsible conduct of research. May be repeated.

CSCI 291. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
Max 12 cr. PREREQUISITE: To be determined based on actual topic offered. Courses not required in any curriculum for which there is a particular one-time
need, or given on a trial basis to determine acceptability and demand before
requesting a regular course number.

CSCI 292. Independent Study. 1-3 Credits. (1-3 Ind; 3 cr max) On Demand
Max 3 cr. PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

CSCI 305. Concepts/Programming Languages. 3 Credits. (3 Lec) S
PREREQUISITE: CSCI 132 and CSCI 246. An examination of several programming
paradigms, and languages, as well as their application and underlying
execution model. Paradigms examined include imperative, object-oriented,
functional, logic and string based. Students will gain exposure to a variety of
languages such as C, C++, Scheme, Prolog and Perl.

CSCI 338. Computer Science Theory. 3 Credits. (3 Lec) S
PREREQUISITE: CSCI 246 and M 171Q. Formal languages, theory, automata,
Turing Machines, computability, the Church-Turing thesis, computational
complexity, and NP-completeness.

CSCI 347. Data Mining. 3 Credits. (3 Lec) S
PREREQUISITES: STAT 216Q or STAT 332 or EGEN 350 and CSCI 232. Recommended: M 221 and CSCI 246. Students are expected to have taken
a statistics/probability course, and have some experience programming. An
introductory linear algebra course and a basic discrete structures course are also
recommended. Introduction to data acquisition and pre-processing, common data
formats, graph models, itemset mining, clustering, dimensionality reduction,
classification, and advanced topics for knowledge discovery from large-scale data
sets, with a focus on applications to real-world data sets.

CSCI 351. Systems Administration. 3 Credits. (3 Lec) S
PREREQUISITE: CSCI 112 and CSCI 232. The administration and management
of Linux computer systems. Includes installation, user/process management,
configuration of services and device handling. A thorough knowledge of Linux/
Unix command structure is required.

CSCI 361. Computer Architecture. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 112 and CSCI 232. The structure and function of computer systems: CPU, memory, I/O. Includes digital logic, data type, instruction set design,
pipelining, RISC, parallel processing, and assembly language programming.

CSCI 366. Computer Systems. 3 Credits. (3 Lec) F.S
PREREQUISITE: CSCI 112 and CSCI 232. Introduces students to fundamental
concepts in computer systems, including software environments and development
tools, computer architecture and organization, concurrency, information
management, network communications, and operating systems based on cloud
computing.

CSCI 432. Advanced Algorithm Topics. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 246 and CSCI 232. A rigorous examination of advanced
algorithms and data structures. Topics include average case analysis, probabilistic
algorithms, advanced graph problems and theory, distributed and parallel
programming. CSCI 338 is recommended as a prerequisite.

CSCI 440. Database Systems. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 232. DBMS architecture; major database models;
relational algebra fundamentals; SQL query language; index file structures, data
modeling and management, entity relationship diagrams.

CSCI 441. Computer Graphics. 3 Credits. (3 Lec) S odd years.
PREREQUISITE: M 221 and CSCI 232. High resolution computer graphics. 3D
graphics programming using a high level API. Vector mathematics for graphics.
Graphics primitives. Curve and surface representations. Transformations using
matrices and quaternions. Representing natural objects with particle systems and
fractals. Shading and lighting models. Global illumination models. Color
representations.

CSCI 442. Comp Vision: Robot Vision. 3 Credits. (3 Lec) S odd years.
PREREQUISITE: CSCI 232. Image processing techniques are used to quantify
and manipulate visual information in diverse applications such as satellite imagery,
robotic vision, and animation. Topics include enhancement, representation,
restoration, segmentation, and digitization techniques.

CSCI 446. Artificial Intelligence. 3 Credits. (3 Lec) F
Alternate Even Years PREREQUISITE: CSCI 232 and CSCI 246. The
fundamental bases of artificial intelligence: knowledge representation, search, and
learning. Applications include game playing, neural networks, and expert systems.

CSCI 447. Machine Learning: Soft Computing. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 232 and CSCI 246. An exploration of biologically inspired
machine learning models and algorithms, including evolutionary algorithms,
networks, swarm intelligence, and fuzzy systems. An emphasis is placed on results
from current research in computational intelligence. Students engage in class
discussions and team projects.

CSCI 451. Computational Biology. 3 Credits. (3 Lec) F odd years.
PREREQUISITE: CSCI 232 and CSCI 246. This course surveys classic and recent
problems from computational biology. Topics covered include algorithms for
genomic sequencing and searching, protein structure prediction, and regulatory
network discovery. Co-convened with CSCI 551.
CSCI 455. Embedded Systems: Robotics. 3 Credits. (3 Lec) S even years.
PREREQUISITE: CSCI 232 and CSCI 361 or EELE 371. The basic tools and
techniques of embedded systems using robotics as a platform. Student teams will
build an autonomous mobile robot, and learn to program it to perform increasingly
sophisticated behaviors. Besides providing an introduction to autonomous mobile
robot technologies, the students also learn key concepts of mechanics, electronics,
programming techniques, and systems design and integration.

CSCI 460. Operating Systems. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 232 and CSCI 361 or EELE 371. Operating systems
design including necessary hardware support, Processes, threads, concurrent

CSCI 466. Networks. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 232 and CSCI 112. How computer systems are
organized into networks and how communication over networks is organized.
Communication protocols and their design with an emphasis on current technology
and implementation of software.

CSCI 468. Compilers. 4 Credits. (3 Lec, 1 Lab) S
COREQUISITE: CSCI 338 and CSCI 305. Senior capstone course. Compiler
design and construction. Scanning, parsing, symbol tables, semantic analysis,
intermediate representations, run-time memory management, target code
generation, and optimization. Implementation of a small compiler.

CSCI 476. Computer Security. 3 Credits. (3 Lec) S
PREREQUISITE: CSCI 232. Introductory to computer security. Covers security
issues in software design and development from technical, social and legal
viewpoints. Topics include cryptography, security models, software security,
authentication, authorization, and system security. CSCI 466 is recommended as a
prerequisite.

CSCI 481. Program Assessment. 0 Credits. (0 Ind) F,S
PREREQUISITE: Graduating Senior. Student participation in Computer Science
program assessment activities such as taking the Computer Science Major Field
Test.

CSCI 482R. Interdisciplinary Project Instruction. 1 Credit. (1 Rct) F
PREREQUISITE: Senior standing. COREQUISITE: ESOF 322 First part of a
senior capstone sequence for the interdisciplinary option. Classroom instruction that
prepares a student to undertake an interdisciplinary project that relates computing to
the student's minor.

CSCI 483R. Interdisciplinary Project. 3 Credits. (3 Ind) S
PREREQUISITE: CSCI 482R. Second part of a senior capstone sequence for the
interdisciplinary option. Students undertake an interdisciplinary project and present
their results through a written paper, a poster and an oral presentation.

CSCI 490R. Undergraduate Research. 1-6 Credits. (1-6 Ind; 12 cr max) On
Demand PREREQUISITE: Consent of instructor. Directed undergraduate research which
can culminate in a research paper, journal article, or undergraduate thesis. Course
will address responsible conduct of research. May be repeated.

CSCI 491. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
Max 12 cr. PREREQUISITE: To be determined based on actual topic offered.
Courses not required in any curriculum for which there is a particular one-time
need, or given on a trial basis to determine acceptability and demand before
requesting a regular course number. Co-convened with CSCI 591.

CSCI 492. Independent Study. 1-4 Credits. (1-3 Ind; 6 cr max) On Demand
Max 6 cr. PREREQUISITE: Junior standing, consent of instructor and approval
of director of the School of Computing. Directed research and study on an individual
basis.

CSCI 494. Seminar. 1-4 Credits. (1-4 Sem; 4 cr max) On Demand
Max 4 cr. PREREQUISITE: Junior standing and as determined by each offering.
Topics offered at the upper divisional level that are not covered in regular courses.
Students participate in preparing and presenting discussion material.

CSCI 495. Field Work/Practicum. 1 Credit. (1 Ind; 2 cr max) F,S
Max 2 cr. PREREQUISITE: Junior standing and CSCI 232. Directed assistance to,
and involvement in labs, with lower division CS students. Can only complete once.

CSCI 498. Internship. 1-6 Credits. (1-6 Ind; 6 cr max) On Demand
PREREQUISITE: Junior standing, consent of instructor and approval of director of the
School of Computing. An individualized assignment arranged with an agency,
business or other organization to provide guided experience in the field.

CSCI 520. Distributed Systems. 3 Credits. (3 Lec) S even years.
PREREQUISITE: CSCI 432 and CSCI 466. The design and implementation of
software systems that utilize multiple host computer networks as a foundation.
Concurrency control, homogeneous and heterogeneous systems, interprocess
communication, protocols and application design.

CSCI 532. Algorithms. 3 Credits. (3 Lec) S
PREREQUISITE: CSCI 232. Concrete time and space complexity; combinatorial
algorithms; greedy algorithms; dynamic programming; probabilistic and
randomized algorithms; branch-and-bound algorithms. CSCI 432 is recommended as a
prerequisite.

CSCI 535. Computational Topology. 3 Credits. (3 Lec) S
COREQUISITES: CSCI 532 or M 461 or M 511 or consent of the instructor.
Provides an introduction to topological data analysis (TPA). This course will
cover the topological, geometric, and algebraic tools used in TDA. Specific topics
covered include persistent homology, Reeb graphs, and minimum homotopy area.
Students will explore a data set of their choice in a course project, and learn how to
apply the tools discussed in lecture.

CSCI 538. Computationality. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 338. Turing machine computability and decidability;
abstract time and space complexity; intractability.

CSCI 540. Advanced Database Systems. 3 Credits. (3 Lec) F odd years.
PREREQUISITE: CSCI 440 or consent of instructor. Advanced database
models including spatial, temporal, and object-oriented; advanced data indexing
techniques, data warehousing and query optimization.

CSCI 541. Computer Graphics. 3 Credits. (3 Lec) S odd years.
PREREQUISITE: M 221 and CSCI 232. Realistic visualization of complex
structures. Current research in high resolution computer graphics. Advanced
graphics computational models. Animation techniques. Architectures for high
resolution graphics.

CSCI 547. Machine Learning. 3 Credits. (3 Lec) S
An exposure to advanced topics from the field of artificial intelligence with
an emphasis on machine learning. Example topics include Bayesian learning,
evolutionary computation, and cognitive science. CSCI 446 is a recommended
prerequisite.

CSCI 548. Reasoning Uncertainty. 3 Credits. (3 Lec)
An exploration of problem solving using structured probabilistic models. Topics in
probabilistic representations, inference algorithms, and learning such models from
data will be explored. CSCI 446 is a recommended prerequisite. Background in
probability recommended.

CSCI 550. Advanced Data Mining. 3 Credits. (3 Lec) F even years.
PREREQUISITE: A probability or statistics course, clustering, classification and
pattern recognition; performing automated discovery of knowledge from a data set.

CSCI 551. Adv Computational Biol. 3 Credits. (3 Lec) F odd years.
PREREQUISITE: CSCI 432. This course examines a variety of algorithmic
computational biology topics with an emphasis on elucidating new research

CSCI 565. Wireless Networks and Mobile Computing. 3 Credits. (3 Lec) F even years
PREREQUISITE: CSCI 466 or (EELE 445 and EELE 447). This course
introduces the topics of wireless networks and mobile computing. Students will
be exposed to different technologies of mobile computing, both software and
hardware, and be able to use them to perform wireless networking analysis.

CSCI 566. Advanced Networking. 3 Credits. (3 Lec) S odd years.
PREREQUISITE: CSCI 466. This graduate-level course covers advanced topics in
networking, with emphasis on IP and wireless networks. After taking this course,
the students are expected to know the state-of-the-art in networking algorithms,
protocols and architectures, and to understand how networking research is done.

CSCI 581. Computational Thinking Tchrs. 2 Credits. (1 Lec. 1 Lab) Su
PREREQUISITE: A minimum of 2 years high school teaching experience. The
course examines the computing field and how it impacts the human condition.
Exciting ideas and influential people are introduced. A gentle introduction to
computational thinking using the Python programming language is provided. The
course also introduces participants to robotic platforms.
CSCI 582. Joy Beauty Data for Teachers. 2 Credits. (1 Lec. 1 Lab) Su
PREREQUISITES: A minimum of 2 years teaching experience at the 7-12 grade level, and CSCI 581, Computer Science in the Classroom: Computational Thinking for Teachers or prior computer science experience, is a pre-requisite. Teachers who enroll in this course will extend their knowledge of the Python programming language and be gently introduced to the world of data science. The course builds upon the pre-requisite course that is the 2-credit, MSSE course entitled Computer Science in the Classroom: An Introduction to Computational Thinking. Teachers who complete this course will be better prepared to teach material covered in CSCI 127, The Joy and Beauty of Computing.

CSCI 590. Master's Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: Master's standing.

CSCI 591. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
Max 12 cr. PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number. Co-convened with CSCI 491.

CSCI 592. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
Max 6 cr. PREREQUISITE: Graduate standing, consent of instructor and approval of director of the School of Computing. Directed research and study on an individual basis.

CSCI 594. Seminar. 1 Credit. (1 Sem; 4 cr max) On Demand
Max 4 cr. PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

CSCI 598. Internship. 1-6 Credits. (1-6 Ind; 6 cr max) On Demand
Max 6 cr. PREREQUISITE: Graduate standing, consent of instructor and approval of director of the School of Computing. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

CSCI 599. Graduate Consultation. 1-3 Credits. (1-3 Ind; 3 cr max) On Demand
PREREQUISITE: Master's standing, consent of instructor and approval of director of the School of Computing. This course may be used only by students who have completed all of their course work, and thesis, if on a thesis plan but who need additional faculty or staff time or help.

CSCI 690. Doctoral Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: Doctoral standing.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leepfrog for a draft with the correct fonts in place.