Department of Scientific Computing Classes SPRING 2022

ISC 1057 3 Credit Hours	***Computational Thinking***	STUDENT	This introductory course considers the question of how computers have come to imitate many kinds of human intelligence. The answer seems to involve our detecting patterns in nature, but also in being able to detect patterns in the very way we think. We will look at some popular computational methods that shape our lives, and try to explain the ideas that make them work. This course has been approved to satisfy the Liberal Studies Quantitative/Logical Thinking requirement.	ONLINE
ISC 2310 3 Credit Hours	***Introduction to Computational Thinking in Data Science with Python***	JANET PETERSON	This course investigates strategies behind popular computational methods used in data science. In addition, many of the algorithms are implemented using the programming language Python. No prior programming experience is required so the course presents the basics of the Python language as well as how to leverage Python's libraries to solve real-world problems in data science. Prerequisite: MAC 1105 or equivalent.	ONLINE
ISC 3313 3 Credit Hours	***Introduction to Scientific Computing with C++***	TBD	This course introduces the student to the science of computations. Topics cover algorithms for standard problems in computational science, as well as the basics of an object-oriented programming language, to facilitate the student's implementation of algorithms. The computer language will be C++. Prerequisite: MAC 2311.	M W F 1:20-2:10 152 DSL
ISC 4220C 4 Credit Hours	***Continuous Algorithms for Science Applications***	SACHIN SHANBHAG	Basic computational algorithms including interpolation, approximation, integration, differentiation, and linear systems solution presented in the context of science problems. The lab component includes algorithm implementation for simple problems in the sciences and applying visualization software for interpretation of results. Prerequisites: ISC 3222, MAC 2312.	M W F 9:20-10:10 T 3:05-5:35 (Lab) 152 DSL
ISC 4245C/CAP 5771 3 Credit Hours	***Data Mining***	ANKE MEYER-BAESE	This course enables students to study concepts and techniques of data mining, including characterization and comparison, association rules mining, classification and prediction, cluster analysis, and mining complex types of data. Students also examine applications and trends in data mining. Prerequisites: COP 3330, ISC 3222, ISC 3313 or ISC 4304, or instructor permission.	M W 12:00-1:15 499 DSL
ISC 4302/5307 3 Credit Hours	***Scientific Visualization***	XIAOQIANG WANG	This course covers the theory and practice of scientific visualization. Students learn how to use state-of-the-art visualization toolkits, create their own visualization tools, represent both 2-D and 3-D data sets, and evaluate the effectiveness of their visualizations. Prerequisite: ISC 5305.	M W F 12:20-1:10 152 DSL
ISC 4304C 4 Credit Hours	***Programming for Science Applications***	PETER BEERLI	Provides knowledge of a scripting language that serves as a front end to popular packages and frameworks, along with a compiled language such as C++. Topics include the practical use of an object-oriented scripting and compiled language for scientific programming applications. There is a laboratory component for the course; concepts learned are illustrated in several science applications. Prerequisites: MAC 2311, COP 3014 or ISC 3313.	T R 9:45-11:00 F 3:05-5:35 (Lab) 152 DSL
ISC 4420/ISC 5425 3 Credit Hours	***Introduction to Bioinformatics***	ALAN LEMMON	Bioinformatics provides a quantitative framework for understanding how the genomic sequence and its variations affect the phenotype. Designed for biologists and biochemists seeking to improve quantitative data interpretation skills, and for mathematicians, computer scientists and other quantitative scientists seeking to learn more about computational biology. Lab exercises reinforce the classroom learning.	M W F 1:20-2:10 499 DSL
ISC 4933/ISC 5227 3 Credit Hours	***Survey of Numerical Partial Differential Equations***	TOMASZ PLEWA	This course provides an overview of the most common methods used for numerical partial differential equations. These include techniques such as finite differences, finite volumes, finite elements, discontinuous Galerkin, boundary integral methods, and pseudo-spectral methods.	T R 11:35-12:50 152 DSL
ISC 4933/ISC 5318 3 Credit Hours	***High-Performance Computing***	XIAOQIANG WANG	Introduces high-performance computing, the use of parallel supercomputers, computer clusters, as well as software and hardware, to speed up computations. Students learn to write faster code that is highly optimized for modern multi-core processors and clusters, using modern software development tools and performance analyzers, specialized algorithms, parallelization strategies, and advanced parallel programming constructs. Prerequisite: ISC 5305 or equivalent or instructor permission.	T R 9:45-11:00 499 DSL
ISC 4943 3 Credit Hours	***Practicum in Computational Science***	ANKE MEYER-BAESE	This practicum allows students to work individually with a faculty member throughout the semester and meet with the course instructor periodically to provide progress reports. Written reports and an oral presentation of work are required. May be repeated to a maximum of six semester hours, with a maximum of only three semester hour credits allowed to be applied to the Computational Science degree.	M W 10:40-11:55 499 DSL
ISC 5316 4 Credit Hours	***Applied Computational Science II***	TOMASZ PLEWA	Provides students with high performance computational tools to investigate problems in science and engineering with an emphasis on combining them to accomplish more complex tasks. Topics include numerical methods for partial differential equations, optimization, statistics, and Markov chain Monte Carlo methods. Prerequisite: ISC 5315.	T R 1:20-2:10 422 DSL R 3:05-5:35 (Lab) 152 DSL