Department of Scientific Computing Classes **FALL 2021**

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 3222 3 Credit Hours	*Symbolic and Numerical Computations*	ALAN LEMMON	Introduces state-of-the-art software environments for solving scientific and engineering problems. Topics include solving simple problems in algebra and calculus; 2-D and 3-D graphics; non-linear function fitting and root finding; basic procedural programming; methods for finding numerical solutions to DE's with applications to chemistry, biology, physics, and engineering. Prerequisite: MAC 2311.	M W F 8:00-8:55 152 DSL
ISC 3313 3 Credit Hours	*Introduction to Scientific Computing with C++*	ASHLEY GANNON	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 12:00-12:50 152 DSL
ISC 4221C 4 Credit Hours	*Discrete Algorithms for Science Applications*	BRYAN QUAIFE	This course offers stochastic algorithms, linear programming, optimization techniques, clustering and feature extraction presented in the context of science problems. The laboratory component includes algorithm implementation for simple problems in the sciences and applying visualization software for interpretation of results. Prerequisite: MAC 2311.	M W F 9:20-10:10 M 3:05-5:35 (Lab) 152 DSL
ISC 4223C 4 Credit Hours	*Computational Methods for Discrete Problems*	ANKE MEYER-BAESE	This course describes several discrete problems arising in science applications, a survey of methods and tools for solving the problems on computers, and detailed studies of methods and their use in science and engineering. The laboratory component illustrates the concepts learned in the context of science problems. Prerequisites: MAS 3105, ISC 4304C.	M W F 1:20-2:10 F 3:05-5:35 (Lab) 152 DSL
ISC 4232C 4 Credit Hours	*Computational Methods for Continuous Problems*	BRYAN QUAIFE	This course provides numerical discretization of differential equations and implementation for case studies drawn from several science areas. We consider both ordinary and partial differential equations. Single-step and multistep methods are investigated for solving initial value problems while finite difference and finite element methods are introduced for boundary value problems. The lab component illustrates the concepts learned on a variety of application problems. Prerequisites: MAS 3105, ISC 4304C.	T R 9:45-11:00 T 3:05-5:35 (Lab) 152 DSL
ISC 4933/ISC 5228 3 Credit Hours	*Markov Chain Monte Carlo Simulations*	SACHIN SHANBHAG	Covered are statistical foundations of Monte Carlo (MC) and Markov Chain Monte Carlo (MCMC) simulations, applications of MC and MCMC simulations, which may range from social sciences to statistical physics models, statistical analysis of autocorrelated MCMC data, and parallel computing for MCMC simulations.	T R 9:45-11:00 422 DSL
ISC 4933/ISC 5317 3 Credit Hours	*Computational Evolutionary Biology*	PETER BEERLI	This course presents computational methods for evolutionary inferences. Presentation includes the underlying models, the algorithms that analyze models, and the creation of software to carry out the analysis.	T R 1:20-2:35 152 DSL
ISC 5305 3 Credit Hours	*Scientific Programming*	GORDON ERLEBACHER	This course uses the C++ language to present object-oriented coding, data structures, and parallel computing for scientific programming. Discussion of class hierarchies, pointers, function and operator overloading, and portability. Examples include computational grids and multidimensional arrays.	T R 1:20-2:35 499 DSL
ISC 5315 4 Credit Hours	*Applied Computational Science I*	CHEN HUANG	Course provides students with high-performance computational tools necessary to investigate problems arising in science and engineering, with an emphasis on combining them to accomplish more complex tasks. A combination of course work and lab work provides the proper blend of theory and practice with problems culled from the applied sciences. Topics include numerical solutions to ODEs and PDEs, data handling, interpolation and approximation and visualization. Prerequisites: ISC 5305; MAP 2302.	T R 11:35-12:50 R 3:05-5:35 (Lab) 152 DSL