Department of Scientific Computing Classes **FALL 2020**

ISC 1057 3 Credit Hours	*Computational Thinking*	SACHIN SHANBHAG	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 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 1:25-2:15 REMOTE
ISC 3313 3 Credit Hours	*Introduction to Scientific Computing with C++*	TA	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 9:05-9:55 REMOTE
DIG 3725/ISC 5326 3 Credit Hours	*Introduction to Game and Simulator Design*	GORDON ERLEBACHER	Techniques used to design and implement computer games and/or simulation environments. Topics include a historic overview of computer games and simulators, game documents, description/use of a game engine, practical modeling of objects and terrain, use of audio. Physics and artificial intelligence in games covered briefly. Programming is based on a scripting language. Topics are assimilated through the design of a 3D game.	T R 11:00-12:15 REMOTE
ISC 4221C 4 Credit Hours	*Discrete Algorithms for Science Applications*	PETER BEERLI	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 10:10-11:00 W 2:30-5:00 (Lab) REMOTE
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 11:15-12:05 M 2:30-5:00 (Lab) REMOTE
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 9:30-10:45 T 3:30-6:00 (Lab) REMOTE
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 1:15-2:30 REMOTE
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 12:20-1:10 REMOTE
ISC 5305 3 Credit Hours	*Scientific Programming*	XIAOQIANG WANG	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 9:30-10:45 REMOTE
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 12:30-1:45 R 3:30-6:00 (Lab) REMOTE