Department of Scientific Computing Classes **SPRING 2015**

ISC 3313 3 Credit Hours	*Introduction to Scientific Computing*	DENNIS SLICE	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++. Prerequisites: MAC 2311, MAC 2312.	M W F 9:05-9:55 048 BEL
ISC 4220 4 Credit Hours	*Algorithms for Science Applications I*	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. Corequisite: ISC 3222; Prerequisite: MAC 2312.	T R 2:00-3:15 217 HCB W 10:00-12:30 (Lab) 152 DSL
ISC 4244/ISC 4933 4 Credit Hours	*Computer Applications in Psychology/in Social Sciences*	GORDON ERLEBACHER	This course gives the students practical knowledge of a powerful and flexible programming language with application to computational and research elements important in their field. Topics include complex searches, image and audio manipulation, data analysis, all in the context of using a variety of software tools and packages.	M W F 1:25-2:15 048 BEL M 2:30-4:30 (Lab) A105 PDB
ISC 4304 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 2312, COP 3014 or ISC 3313.	T R 9:30-10:45 217 HCB F 10:00-12:30 (Lab) 152 DSL
ISC 4933/ISC 5935 3 Credit Hours	*Genomic Sequencing and Analysis*	ALAN LEMMON	After an overview of the emerging DNA sequencing technologies, students will be introduced to algorithms designed to assemble billions of nucleotides of DNA sequence data both with and without a reference genome. Students without programming experience will utilize pre-existing software packages, whereas students with programming experience will develop and implement new algorithms for analysis. Students may also have the opportunity to collect and analyze data using a state-of-the art genome sequencer (Illumina MiSeq).	M W F 10:10-11:00 117 BEL
ISC 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 11:15-12:05 243 BEL
ISC 5315 4 Credit Hours	*Applied Computational Science I*	JANET PETERSON	This 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 11:00-12:15 217 HCB R 2:00-4:30 (Lab) 152 DSL
ISC 5415 3 Credit Hours	*Computational Space Physics*	TOMASZ PLEWA	Introduction to numerical methods in the context of observational and theoretical astrophysics. Interpolation,approximation, minimization and optimization, solution of linear systems of equations, random number generation, function integration, numerical differentiation, numerical integration of ordinary differential equations, stiff systems of ODEs, survey of methods for PDEs (Poisson equation, heat diffusion, and hydrodynamics). Prerequisites: CGS 3406, PHZ 4151C.	T R 12:30-1:45 007 BEL
ISC 5935 3 Credit Hours	*Uncertainty Analysis*	MING YE	Theoretical foundations and practical applications of uncertainty assessment and risk analysis in earth and environmental sciences, with focus on quantification and reduction of uncertainties impacting geological and environmental processes. Course also deals with scientific and technical uncertainty and risk analysis in support of science-based decision-making by scientists, engineers, and regulatory agencies.	M W F 12:20-1:10 048 BEL
ISC 5935 3 Credit Hours	*Density Functional Theory*	CHEN HUANG	The course is designed for materials scientists, chemists, physicists, and applied mathematicians who are seeking to know both the basic concept and certain advanced topics in density functional theory. Density functional theory is widely used nowadays in both industry and academia to simulate various properties of materials and molecules, such as electronic properties, crystal structures, and chemical reactions. In this course, we will learn how to solve realistic materials problems using density functional theory and the underlying theories.	M W F 2:30-3:20 499 DSL