Department of Scientific Computing Classes FALL 2015

Course	Title	Instructor	Description	Schedule
ISC 3222 3 Credit Hours	*Symbolic and Numerical Computations*	MING YE	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. Prerequisites: MAC 2311, MAC 2312.	T R 2:00-3:15 152 DSL
ISC 3313 3 Credit Hours	*Introduction to Scientific Computing with Fortran*	JANET PETERSON	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 Fortran. Prerequisites: MAC 2311, MAC 2312.	M W F 12:20-1:10 152 DSL
DIG 3725/ISC 5935 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. Prerequisite: MAC 2311.	T R 12:30-1:45 499 DSL
ISC 4221 4 Credit Hours	*Algorithms for Science Applications II*	CHEN HUANG	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. Prerequisites: MAC 2312, ISC 3222. Co-requisite: ISC 4304C.	T R 9:30-10:45 R 3:30-6:00 (Lab) 152 DSL
ISC 4223 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 4304.	T R 11:00-12:15 T 3:30-6:00 (Lab) 152 DSL
ISC 4232/ISC 5935 4 Credit Hours	*Computational Methods for Continuous Problems*	JANET PETERSON	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 4304.	M W F 10:10-11:00 M 4:00-6:30 (Lab) 152 DSL
ISC 4933/ISC 5935 3 Credit Hours	*Computational Forensics*	DENNIS E. SLICE	This course will investigate some of the methods and protocols of Computational Forensics with an emphasis on the analysis and interpretation of physical evidence. Topics will include stature, sex, and ancestry estimation from skeletal remains, DNA analysis, and fingerprint, toolmark, and bloodstain analysis. Students will develop their own simple programs in the R programming language to build and verify models and use existing programs to investigate the processing and analysis of physical evidence.	T R 2:00-3:15 499 DSL
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 12:30-1:45 152 DSL
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.	M W F 9:05-9:55 152 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.	M W F 11:15-12:05 M 1:30-4:00 (Lab) 152 DSL
ISC 5935 3 Credit Hours	*Practical Genetic Inference*	PETER BEERLI	We'll discuss the use of 10+ different computer programs to infer population genetic parameters or phylogenetic trees from genomic/genetic data. For each the theory behind the inference is explained and a test dataset analyzed. You'll need a laptop for exercises and homework. After a short overview about population genetics and phylogenetics, we'll look at genepop, arlequin (amova), geneland, structure, dadi, eems, treemix, migrate (parameter estimation), migrate (model selection), beast2 (phylogeny estimation), beast2 (divergence time estimation), snapp, and svdquartets.	M W F 1:25-2:15 499 DSL