Computer & Computational Mathematics (CCM)

COURSE OFFERINGS

CCM 150  Computer Science I
4.000 Credits
Prerequisites: MATH 115*
Co-requisites: CCM 150L

An introduction to structured computer programming covering problem formulation, algorithm development, the C++ programming language, program testing and debugging, capabilities and elements of computer organization, and object-oriented software methodologies.

CCM 172  Computing Environ for Math
3.000 Credits
Must be enrolled in one of the following Colleges:
Coll of Arts, Sciences&Letters
Must be enrolled in one of the following Classes:
Senior
Sophomore
Freshman
Junior
Prerequisites: MATH 115

This course covers introductory programming techniques for Mathematics majors. Students will learn to program in Mathematica, MatLab, and C++. Topics include data types, variables and assignments, decisions, loops, functions, recursion, arrays and pointers. Programming assignments will focus on problems that are mathematical in nature, giving students an opportunity to use simulations to understand and verify familiar mathematical results. This course, or CIS/CCM 150, satisfies the programming requirement for the Mathematics concentration.

CCM 305  The Theory of Computation
3.000 Credits
Prerequisites: CIS 175 and (CIS 200 or IMSE 200)

An introduction to the foundations of computer science including the theory of computability, Turing machines, automata, and formal languages.

CCM 315  Applied Combinatorics
3.000 Credits
Prerequisites: MATH 200 and (MATH 217 or MATH 227)

An introduction to methods and applications of enumerative and configural combinatorics. Students study several elegant and useful techniques for counting and/or generating the elements in large and unwieldy finite sets. Students will also study topics in graph theory that are applicable to real world problems. Topics include basic counting principles, the principle of inclusion-exclusion, generating functions and recurrence relations. Topics from graph theory include graph models, paths, circuits, cycles, connectedness, planarity, coloring, directed graphs, networks and network flows.

CCM 372  Computing with Mathematica
3.000 Credits
Prerequisites: MATH 217 or MATH 227

The course explores a variety of topics from different areas of undergraduate mathematics including calculus, matrix algebra, number theory, geometry, and discrete mathematics. Students learn to design customized Mathematica functions to solve specific problems in these areas using the symbolic, computational, graphics, and programming tools provided within Mathematica.

CCM 390  Topics in Computational Math
1.000 TO 3.000 Credits

A course designed to offer selected topics in different areas of applied mathematics. The specific topics will be announced together with the prerequisites for each separate offering. Course may be repeated when the topics covered differ.

CCM 399  Independent Studies
1.000 TO 3.000 Credits

Readings or analytical assignments in Computers and Computational Mathematics in accordance with the needs and interests of those enrolled and agreed upon by the student and advising instructor.

CCM 404  Dynamical Systems
3.000 Credits
Prerequisites: MATH 216 and (MATH 217 or MATH 227)

The aim of this course is to survey the standard types of differential equations. This includes systems of differential equations, and partial differential equations, including for each type, a discussion of the basic theory, examples of applications, and classical techniques of solutions with remarks about their numerical aspects. Also included are autonomous and periodic solutions, phase space, stability, perturbation techniques and Method of Liapunov. (AY).

CCM 451  Computer Graphics
3.000 Credits
Prerequisites: (CCM 350 or CIS 350 or IMSE 350) or (ECE 370 and MATH276) and (MATH 215 or MATH 205) and (MATH 217 or MATH 227)

Basic geometrical concepts: graphics output primitives, two-dimensional transformations, windowing and clipping, three-dimensional viewing, visible surface detection methods, graphical user interfaces.

CCM 458  Introduction to Wavelets
3.000 Credits
Prerequisites: MATH 216 and (MATH 217 or MATH 227)

This course will introduce the students to theory and application of wavelets using linear algebra. Topics will include the discrete Fourier transform, the fast Fourier transform, linear transformations, orthogonal decomposition, discrete wavelet analysis, the filter bank, Haar Wavelet family, Daubechies's Wavelet family, and applications. Students cannot receive credit for both MATH 458 and MATH 558. (OC)
CCM 472  Intro to Numerical Analysis
3. 000 Credits
Prerequisites: MATH 217 or MATH 227

Solution of linear systems by Gaussian elimination, solution of nonlinear equations by iterative methods, numerical solutions of ordinary differential equations, data fitting with spline functions, numerical integration, optimization. (F).

CCM 473  Matrix Computation
3. 000 Credits
Prerequisites: MATH 217 or MATH 227

A study of the most effective methods for finding the numerical solution of problems which can be expressed in terms of matrices, including simultaneous linear equations, orthogonal projections and least squares, eigen values and eigenvectors, positive definite matrices, and difference and differential equations. (AY).

Cooperative Education Program
(not a field of concentration)

Cooperative Education is a nationally recognized educational plan that integrates academic study with paid, real world work experience. UM-Dearborn cooperates with business, industry, government and other private and public agencies to offer work assignments related to students' educational programs and career objectives.

Students may earn a maximum of 10 S/E credit hours through co-op work assignments of one to three credit hours each, and a mandatory one credit-hour seminar. Students should be aware that applying for co-op does not guarantee job placement. Liberal arts students are advised to use curriculum electives to acquire the technical skills needed to improve their marketability and to avail themselves of career counseling available through the Career Services Office.

For eligibility information, see Cooperative Education in Special Programs, or contact the Cooperative Education Office, Room 1038 CB, (313) 593-5188.

Criminal Justice Studies

Criminal Justice Studies is a field that focuses on the study of criminal behavior and society’s response to it. The field draws upon the insights of the social and behavioral sciences, the physical sciences, statistics, and the humanities to illuminate the issues of maintaining social order in a constitutional democracy committed to individual freedom, equality, and justice. More specifically, the field focuses on the causes and prevention of criminal behavior. The criminal justice system is composed of the police agencies, prosecutors, the legal profession, the courts, and correctional agencies, among others. The system is part of a larger social system which invariably influences the effectiveness and fairness of law enforcement. Criminal justice analyzes system responses to the changes in social values and law enforcement. The program in Criminal Justice Studies at UM-Dearborn is intended to prepare students for careers in public security, criminal justice administration, law and paralegal professions, public administration, policy analysis, and graduate study in the social and behavioral sciences.

PREREQUISITES TO THE CONCENTRATION

Because UM-Dearborn courses are 300-level or higher and are offered by the disciplines of philosophy, political science, psychology, and sociology, they may require these prerequisites: PHIL 240, POL 101, PSYC 170 or 171, and SOC 200 or SOC 201.

CONCENTRATION REQUIREMENTS

Required Core Courses........................................9 hours
CRJ 200  Introduction to Criminal Justice Studies
CRJ 468  Criminology
Plus one course from the following:
CRJ 363  Criminal Justice Systems and Policy
CRJ 480  Applied Criminal Justice Theory
CRJ 489  Law, Crime, and Society

Special Topics in Criminal Justice............................3 hours
CRJ 467  Drugs, Crime, and Justice
CRJ 470  Current Issues in Criminal Justice
CRJ 472  Correctional Systems
CRJ 473  Race, Crime, and Justice
CRJ 474  Cyber Crimes
CRJ 475  Digital Evidence

Ethics.................................................................3 hours
CRJ 240  Ethics
CRJ 303  Justice
CRJ 308  Moral and Political Dilemmas
CRJ 445  Seminar in Contemporary Ethical Theory
CRJ 482  Legal Ethics
CRJ 490  Topics in Criminal Justice

Social Justice..........................................................3 hours
CRJ 305  Race, Justice, and Freedom
CRJ 322  Psychology of Prejudice
CRJ 323  Urban Politics
CRJ 350  Poverty and Inequality
CRJ 369  Civil Rights Movement
CRJ 384  Immigration in America
CRJ 403  Minority Groups
CRJ 423  American Social Classes
CRJ 435  Urban Sociology
CRJ 443  Gender Roles
CRJ 455  Immigrant Community in North America
CRJ 461  Women in Prison
CRJ 466  Drugs, Alcohol, and Society
CRJ 476  Inside Out Prison Exchange

Law and Society.......................................................3 hours
CRJ 302  Theory of Law
CRJ 316  American Judicial Process
CRJ 335  Philosophy of Law
CRJ 362  Women, Politics, and the Law
CRJ 413  American Constitutional Law
CRJ 414  Civil Rights and Liberties
CRJ 416  Criminal Law
CRJ 453  Sociology of Law
CRJ 471  Comparative Criminal Justice Systems

Human Interaction & Social Control..........................3 hours
CRJ 325  Psychology of Interpersonal Relations
CRJ 382  Social Psychology
CRJ 407  Psychology of Adolescence
CRJ 421  Group Processes
CRJ 440  Abnormal Psychology
CRJ 446  Marriage and Family Problems
CRJ 447  Family Violence
CRJ 465  Deviant Behavior and Social Disorganization
CRJ 469  Juvenile Delinquency
CRJ 480  Applied Criminal Justice Theory