COMPUTER & COMPUTATIONAL MATH (CCM)

CCM 504 Dynamical Systems 3 Credit Hours
This course is an introduction to nonlinear dynamics and chaos with applications taken from engineering and the sciences. Topics include: one dimensional flows and bifurcations, two dimensional linear systems, phase plane analysis, limit cycles, and bifurcations. The class will finish with an introduction to chaotic systems and strange attractors. Additional reading assignments or projects will distinguish this course from its undergraduate version MATH 404. Students cannot receive credit for both MATH 404 and MATH 504. (AY).
Prerequisite(s): MATH 228 and MATH 227
Restriction(s):
Cannot enroll if Class is
Can enroll if Level is Rackham or Graduate

CCM 551 Computer Graphics 3 Credit Hours
Basic geometrical concepts, graphics primitives, two-dimensional transformations, segmented files, windowing and clipping, camera models, and 3-D viewing transformations.
Restriction(s):
Can enroll if Class is Graduate
Can enroll if Level is Rackham or Doctorate
Can enroll if Degree is Master of Sci in Engineering, Doctorate in Science, Master of Science
Can enroll if College is Engineering and Computer Science
Can enroll if Major is Software Engineering, Data Science, Computer & Information Science, Computer Engineering

CCM 558 Introduction to Wavelets 3 Credit Hours
This course will introduce the student to theory and application of wavelets using linear algebra. Topics will include the discrete Fourier transform, linear transformations, orthogonal decomposition, discrete wavelet analysis, the filter bank, Harr Wavelet family, Daubechies's Wavelet family, and applications. Additional reading assignments or projects will distinguish this course from its undergraduate version CCM 458. Students cannot receive credit for both CCM 458 and CCM 558. (OC)
Prerequisite(s): (MATH 216 or MATH 217 or MATH 228) and MATH 227
Restriction(s):
Can enroll if Class is Graduate
Can enroll if Program is MS-Applied&Computational Math

CCM 572 Introduction to Numerical Analysis 3 Credit Hours
This course is an introduction to numerical analysis and scientific computing. Topics include: floating point representation, round off error, root finding techniques, interpolation, numerical integration, Gaussian elimination and techniques for solving linear systems, minimizing functions, and methods for solving ordinary differential equations numerically. Students cannot receive credit for both MATH 472 and MATH 572. (F).
Prerequisite(s): MATH 227 or MATH 228
Restriction(s):
Cannot enroll if Class is
Can enroll if Level is Rackham or Graduate

CCM 573 Matrix Computation 3 Credit Hours
A study of the most effective methods for finding the numerical solution of problems that can be expected in terms of matrices, including simultaneous linear equations, orthogonal projections and least squares, eigenvalues and eigenvectors, positive definite matrices, and difference and differential equations. Additional reading assignments or projects will distinguish this course from its undergraduate version CCM 473. Students cannot receive credit for both CCM 473 and CCM 573. (AY)
Prerequisite(s): MATH 217 or MATH 227
Restriction(s):
Can enroll if Class is Graduate

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally