COMPLEX SYSTEMS (CSYS)

Courses

CSYS 5766. Gr Chaos, Fractals, & Dynmcal Syst. 3 Credits.
Discrete and continuous dynamical systems, Julia sets, the Mandelbrot set, period doubling, renormalization, Henon map, phase plane analysis, and Lorenz equations. Prerequisite: Graduate student or Instructor permission. Cross-listed with: MATH 5766.

CSYS 5870. Data Science I - Experience. 3 Credits.
Data harvesting, cleaning, and summarizing; working with non-traditional, non-numeric data (social network, natural language textual data, etc.); scientific visualization; advanced data pipelines with a practical focus on real datasets and developing good habits for rigorous and reproducible computational science; Project-based. Prerequisites: Graduate student; Instructor permission; knowledge of CS 1210 and either STAT 1410 or STAT 2430 assumed; knowledge of CS 2100 and MATH 2522 or MATH 2544 strongly recommended. Cross-listed with: STAT 5870, CS 5870.

CSYS 5990. Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.

CSYS 6020. Modeling Complex Systems. 3 Credits.

CSYS 6391. Master's Thesis Research. 1-9 Credits.
Master’s thesis research under the supervision of a graduate faculty member. Prerequisite: Instructor permission.

CSYS 6392. Master's Project Research. 1-6 Credits.
Masters project under the supervision of a graduate faculty member. Prerequisite: Instructor permission.

CSYS 6520. Evolutionary Computation. 3 Credits.

CSYS 6540. Deep Learning. 3 Credits.

CSYS 6701. Principles of Complex Systems. 3 Credits.
Introduction to fundamental concepts of complex systems. Topics include: emergence, scaling phenomena and mechanisms, multi-scale systems, failure, robustness, collective social phenomena, complex networks. Students from all disciplines welcomed. Pre/co-requisites: Calculus, statistics required; linear algebra, differential equations, computer programming recommended. Cross-listed with: MATH 6701.

CSYS 6713. Complex Networks. 3 Credits.
Detailed exploration of distribution, transportation, small-world, scale-free, social, biological, organizational networks; generative mechanisms; measurement and statistics of network properties; network dynamics; contagion processes. Students from all disciplines welcomed. Pre/co-requisites: Calculus, statistics required. Cross-listed with: MATH 6713.

CSYS 6870. Data Science II. 3 Credits.
Advanced data analysis, collection, and filtering; statistical modeling, monte carlo statistical methods, and in particular Bayesian data analysis, including necessary probabilistic background material; a practical focus on real datasets and developing good habits for rigorous and reproducible computational science. Prerequisite: STAT 3870, CS 3870, CSYS 5870, or Instructor permission. Cross-listed with: CS 6870, STAT 6870.

CSYS 6990. Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.

CSYS 6991. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

CSYS 6993. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CSYS 6995. Graduate Independent Research. 1-18 Credits.
Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CSYS 7491. Doctoral Dissertation Research. 1-18 Credits.
Research for the Doctoral Dissertation.

CSYS 7980. Applied Geostatistics. 3 Credits.
Introduction to the theory of regionalized variables, geostatistics (kriging techniques), special topics in multivariate analysis. Applications to real data subject to spatial variation are emphasized. Prerequisites: STAT 5230, CS 1210; or Instructor permission. Cross-listed with: CEE 7980, STAT 7980.

CSYS 7990. Special Topics. 1-18 Credits.
See Schedule of Courses for specific titles.
CSYS 7995. Graduate Independent Research. 1-18 Credits.
Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.